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REPORTS
FROM
COMMITTEES.

(3.)

SIX REPORTS ON HOLYHEAD ROADS;
MR. TELFORD'S REPORT; HOLYHEAD HARBOUR;
SHREWSBURY AND BANGOR FERRY ROAD;
&c.

Session
5 February - - to - - 6 August,
1822.

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1822.



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FIRST
REPORT

OF THE

SELECT COMMITTEE

ON THE

ROADS

FROM LONDON TO HOLYHEAD, AND FROM
CHESTER TO HOLYHEAD; &c.

NORTH WALES.

*Ordered, by The House of Commons, to be Printed,
25 February 1822.*

SECOND
R E P O R T

OF THE
SELECT COMMITTEE
ON THE

R O A D S

FROM LONDON TO HOLYHEAD,

AND

FROM CHESTER TO HOLYHEAD;

&c.

STEAM PACKETS.

*Ordered, by The House of Commons, to be Printed,
2 April 1822.*

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SECOND REPORT.

THE SELECT COMMITTEE appointed to inquire into the state of the Roads from *London* to *Holyhead*, and from *Chester* to *Holyhead*; into the regulations for conveying His Majesty's Mail between *London* and *Dublin*, and between the Northern Parts of *England* and *Dublin*, and between *Dublin* and the interior of *Ireland*; and into the state of the Mail Coach Roads in *Ireland*; and to report their Observations thereupon, together with the MINUTES of the EVIDENCE taken before them, from time to time, to the House;—HAVE, pursuant to the Order of the House, further examined the Matters to them referred, and have agreed to the following REPORT:

YOUR Committee have proceeded, in compliance with that part of the instructions of the House, which relates to the conveyance of His Majesty's Mails between *Holyhead* and *Howth*, to examine into the circumstances attending the establishing of Steam Packets at Holyhead in the course of last year. For this purpose two vessels, called the *Royal Sovereign* and *Meteor*, were built, by order of the Postmasters General, in the River Thames, on a plan to give to them the greatest possible strength, and the advantage of the most improved engines. The Evidence which has been given to Your Committee by a Commander of one of them, Captain Rogers, leaves no doubt of the practicability of performing the Post Office service at Holyhead by Steam Vessels, with as great safety as it can be performed by Sailing Vessels, even in the most tempestuous weather; and at the same time by voyages, on an average not exceeding one-half of the number of hours which formerly was the average of the voyages of the Sailing Packets. But Your Committee are not as yet prepared to enter into all the details of this important subject, their object in presenting this Report to the House, is merely to convey to the House an opinion they have come to, in consequence of the evidence of Mr. George Henry Freeling and of Captain Rogers, that the Postmasters General ought immediately to give orders for building a new Steam Packet, so that at least there should be three Packets on the Holyhead Station, before the commencement of the next winter, of that peculiar construction which has enabled the *Sovereign* and *Meteor* to go to sea throughout the whole of the last winter.

Your Committee strongly recommend the same general plan of construction should be adopted in building a new Packet, as that on which the Sovereign and Meteor were built ; and also, that the Engine should be made by Messrs. Boulton and Watt. They also recommend that the suggestions of Captain Rogers should be attended to in all matters respecting the building of a new Packet, as those suggestions will come from a person who appears to Your Committee to possess great knowledge in seamanship and ship-building, and by the experience of commanding a steam vessel through a most tempestuous winter, to have made himself master of the best method of managing one at sea, and also of all the main properties of the mechanism of the engine.

Your Committee have annexed to this Report the evidence of Mr. George Henry Freeling, Captain Rogers, Mr. J. Brown, and Captain John Percy, and also certain Queries which they have sent to several persons who have had the most experience in constructing and navigating steam vessels. They intend to continue their inquiries upon this interesting subject, and hope to present to the House a full Report upon all its details before the close of the Session.

2d April 1822.

MINUTES OF EVIDENCE.

George Henry Freeling, Esq.	-	-	-	-	-	-	pp. 13 & 18
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Jovis, 21^o die Martij, 1822.

SIR HENRY PARNELL, BARONET,

IN THE CHAIR.

George Henry Freeling, Esquire, called in; and Examined.

*G. H. Freeling,
Esq.*

(21 March.)

THE Holyhead steam packets have been principally under your management :—They have.

Be so good as to state to the Committee, generally, the course of proceedings which have taken place for introducing the use of steam vessels upon the Holyhead station.—The Postmasters General have been obliged to purchase all the sailing packets, and to clear the station for the introduction of those vessels; the object was, at first, to make the steam auxiliary to the sailing packets, but we found that the steam packets could do even more than the sailing packets, consequently we keep two sailing vessels as auxiliary to the steam.

How many steam packets have you employed?—We have three altogether, exclusive of the Tartar.

Be good enough to name them and describe them.—The Royal Sovereign of 210 tons, and the Meteor of 190; the Sovereign is fitted with two engines of forty-horse power each, and the Meteor with two engines of thirty-horse power; they were both constructed by Boulton and Watt.

Where were the vessels built?—In the river Thames, by a person of the name of Evans, at Rotherhithe.

Were they built purposely of any particular strength?—They were built on purpose for the service, under the inspection of the officers of the Navy Board; they were built upon Sir Robert Seppings's principle of the diagonal fastening, and made particularly strong.

What is the third steam vessel?—The third is the Ivanhoe, which was formerly on the Holyhead station as a private vessel.

What is her tonnage?—165; the power of the engines fifty-six.

Is she as strongly constructed as the others?—No.

Was she used by the former proprietors for winter voyages?—She has been out in very bad weather, but has not been run the whole winter.

What has been the general effect of the experiment, in regard to maintaining a communication between the two countries?—The intercourse has been very much facilitated; it is now almost reduced to a certainty. In the year preceding the introduction of the steam vessels, a hundred mails exactly arrived in London after they were due, and in the nine months that the steam vessels have been running since May last, there have been twenty-two only.

Those nine months include the winter months?—Yes; when we have had much worse weather than the year preceding. The paper I have before me will more fully explain this.

G. H. Freeling,
Esq.

(21 March.)

[The witness delivered in the paper, which was read as follows:]

"From the Return made to the Order of the Committee on Holyhead Roads, of the number of voyages performed by the *Sovereign* and *Meteor*, it appears, that in a period of 265 days to the 20th February last, they have made 205 passages only.

"The remaining 60 days may be thus accounted for;—

The Talbot was on duty	-	-	-	16 days.
The Ivanhoe	-	-	-	6 -
The Tartar	-	-	-	8 -

"In 30 instances no steam packet left Holyhead, in 11 of these whilst the steam packets were under repair the mails were dispatched by sailing vessels, which effected the passage, in four instances, in time for the departure of the coaches from Dublin.

"In the other 19 instances, the weather prevented any vessel from putting to sea, or forced the steam packets back after having put out.

"Twenty-five mails have been brought from Ireland by sailing packets.

"The steam packets have been too late for the *Liverpool* mail in about 40 instances, and the *London* mail has been out of course in 22 cases only."

How was the weather this winter at Holyhead, as compared with other winters?—I understand that the weather, the beginning of the winter, was worse than has been known for more than sixty years. We have proof that the steam packets will go to sea in weather when sailing packets could not have gone to sea; the captains have always considered that it would not be prudent to go to sea, if they were obliged to be under a three-reefed mainsail, and the steam packets have gone out in weather in which the sailing packets would have been obliged to be so.

Were they able in those cases to make their passages in a reasonable space of time?—Yes; the longest passage, I think, was seventeen hours and twenty minutes.

Was that in a gale of wind, with the wind adverse?—Yes, decidedly.

What was the shortest passage?—Five hours and thirty minutes.

What is the average of the passages of the *Sovereign* from *Howth* to *Holyhead*?—Six hours and fifty-seven minutes, and the *Meteor* seven hours and four minutes and a fraction. To *Howth*, the *Sovereign* seven hours thirty-six minutes and a quarter, the *Meteor* eight hours and thirteen minutes: the shortest passage was from *Howth*, five hours and thirty minutes.

Do the steam packets sail at all times from Holyhead, notwithstanding a bad gale of wind?—Sometimes the weather is so bad they cannot venture to put out.

By what regulation is the point determined, whether the packet shall go to sea or not?—The captain reports to the agent, and if the agent is not satisfied, his instructions are to send out another captain in charge of the packet, if he will go; if both refuse to go nothing of course can be done. There are three or four instances in which they have put out, and found they had not head-way, and of course it was better to come back than to attempt the passage.

Do they usually steer in the face of the wind?—The best point for a steam vessel, in very bad weather, is directly head to wind; both wheels can then act at the same time. The captains sometimes keep the vessel away, when it is blowing very strong, two or three points; then, when they get on the opposite coast, they will take in their sails, and steam to the harbour in smoother water.

Do you not conceive that the success of those two vessels, the *Sovereign* and the *Meteor*, is very much attributed to the superior manner in which they were constructed?—Decidedly.

Do you think any steam vessels, you are acquainted with, could have gone through the same difficulties that they successfully encountered?—I have attempted to gain some information about every steam vessel which has been built, and I am convinced those vessels will do what no other vessel can do; they will go to sea in weather when nothing else can. I attribute that not only to the machinery, but to the weight of the hull; a lighter vessel in a heavy sea would be checked, but those vessels have from their weight a momentum so great, that it carries them on when a lighter vessel would have been checked; the weight acts as a fly-wheel.

The

The weight they have arises from the great quantity of timber and iron used in the construction?—They are filled in solid, and they are nothing but masses of wood and copper.

G. H. Freeling,
Esq.

(21 March.)

To what height are they built solid on the sides?—I cannot state that.

In speaking of the tonnage of those vessels, do you mean the tonnage of the vessel estimated according to the rules applicable to other vessels, or the cargo these steam vessels are capable of actually carrying?—On the rules applicable to common and ordinary vessels.

Those vessels are coppered and copper-fastened?—Yes.

Every thing has been done to render them as secure and strong as possible?—Certainly; I have the authority of Mr. Lang of the Navy Board for stating that, with the exception of the Discovery ships, there are no vessels so strong.

Is it your opinion that three packets are a sufficient number for maintaining the communication between Holyhead and Dublin, so that two shall sail every day?—Yes.

What is the arrangement with respect to allowing sufficient time for looking over the engines and keeping them in repair?—With the view that there might be a sufficient time allowed for looking over the machinery and the vessels, it was arranged that they should each be six days at sea and three days in harbour, which affords ample time for inspecting the machinery; that has been fixed in a great measure with reference to the engineers themselves, who stated that that time was more than sufficient for it.

Under whose care are the engines?—Under the charge of the engineers. When the packets were first established, as it was at so great a distance from London, we wanted men, not merely practical engineers, but having a greater portion of science than men of that description generally have, we were obliged to give very high wages, but we got certainly the two best men there were; we were obliged to buy them out of their situations in the River, one for each of those two vessels, the Meteor and the Sovereign. As the *Ivanhoe* might perhaps be merely a temporary vessel, we got the engineer who was with her from Liverpool, but of course we shall obtain the best engineer to be procured when a third packet is regularly established.

Each engineer has charge of his own engine?—Yes.

In what manner is the packet commanded?—There are four captains, who take it in turn; there being three vessels, each has charge of the vessel going the six days in turn, and once in a month the captains go off duty for eight days—the fourth allows a relief.

Is the engineer under the command of the captain?—Yes; certainly.

How many men are there on board each?—At present, as there are only two vessels, there are sixteen men on board each; as the work is very severe, there being only two vessels running every day, the complement for them, when a third is upon the station, is fifteen for the Sovereign, being the larger vessel, fourteen for the Meteor, and fourteen for the *Ivanhoe*.

What work do you allude to?—The going to sea every day, and clearing the boilers, and putting the vessels in proper order.

What time does that take after each voyage?—It takes a good while in the whole, as the boiler must be allowed to cool; the cold air must not be let in; it was found to crystallize the salt and injure the boilers, and we were obliged to cease doing that.

The seamen have not much spare time after a long voyage before the commencement of a fresh voyage?—In moderate weather they have.

There have been some accidents to the engines?—Yes, there have; but I hope that will be prevented in future; it was, I think, I may say almost entirely, to be attributed to the use of cast iron; the cross bars and the beams were of cast iron, and if any water was in the cylinder at starting, the check caused the cast iron to break; we have now got them made of wrought iron, but the lower beams of the engines, which are very large, are still of cast iron; there must be some part of the engine left to give way in case of any emergency, which is better than destroying the cylinder.

Have you altered those parts which were faulty?—Yes.

180.

Since

G. H. Freeling,
Esq.

(21 March.)

Since that there have been no accidents?—There has been one I think.

There was an accident in the summer with a beam?—Yes; they were of cast iron and hollow, since that we have got solid shafts of malleable iron.

Are the sails sufficient to navigate the vessels in case the engines fail?—Scarcely; there is sufficient to do it in case of emergency, but we have been trying experiments on the Dover station with different sorts of sails, and we find lug sails are more powerful than any others, and we have now sent down lug sails for the Holyhead packets instead of their fore and aft sails.

Is there any prospect of their being effectual to enable a packet to beat to windward?—A packet is so large a vessel it would not enable her perhaps to fetch to windward, but she would be able to reach some port, but there being two engines they can be disconnected, and one worked without the other; it has happened that a packet has proceeded using one engine only.

That is in case the main shaft does not break?—Yes.

You mentioned that the vessels were exposed to injury from Holyhead Harbour being so crowded, how has it been in the course of the last winter?—It has been frequently very much crowded; some time since two large brigs broke adrift in the harbour, and got foul of two of the steam packets; they did not do any very great injury.

It happens frequently in a gale of wind, that a great number of vessels come into harbour at Holyhead?—Yes, a very great number.

More than the size of the harbour is able on the sudden to accommodate?—Yes.

Have you any accommodation yet in the way of a graving dock?—No, I wish we had; it would be a very great object indeed for our service if there were to be a graving dock at Holyhead; at present they must go either to Liverpool or Milford; and Boulton and Watt, who furnish the machinery, are very anxious we should not go to Liverpool in case of accident, lest their competitors there should obtain possession of some of their machinery.

You have two sailing packets?—Yes; one stationed on each side.

Do they change?—They go across occasionally, once a week or a fortnight.

Are they commanded by a regular captain?—No, the mate is in charge; the mates who are selected for that are the most respectable men in the service.

What crew have they?—The sailing packet at Howth is fully manned; I think there are nine persons on board, including the mate.

Do they carry the mails?—Yes, when there is no steam packet; that at Holyhead has only four men as her regular complement, because we can always get enough people on a sudden to man her completely to go over.

Do they cross the Channel on any fixed days?—No; there are no fixed days.

Can any person hire a sailing packet that pleases?—It has never been made a question of; but it would be an object not to let them go lest an accident should happen to the steam packet expected next day; if there were three steam packets I conceive there might be no difficulty in allowing any person to hire one of them at Holyhead.

You have mentioned that there are only two steam packets at present that have been built particularly for the Holyhead service, the Meteor and the Sovereign; is it intended to build a third so as to make up your complement of three?—The Postmasters General have long had under consideration the building a third vessel, but when the *Ivanhoe* was purchased they wished to have a proof of what she could do before they began to build; they do not expect that the *Ivanhoe* will be found sufficient to run in the winter, and I believe measures have been taken for building a third vessel specially for the service, as far as regards obtaining plans and estimates.

Do you look forward to any improvements in constructing the new one?—I think the shape of the vessel can be improved to give her more velocity.

Which of the two is reckoned the best, the Sovereign or the Meteor?—It is hardly possible to draw a fair comparison, one of them having twenty-horse power more than the other; the bow of the Sovereign is infinitely superior to the bow of the Meteor, but the quarter of the Meteor is much better than the quarter of the Sovereign; if we could take the bow of the Sovereign and the quarter of the Meteor we should make a perfect vessel.

Has

Has the experiment led you to expect that an eighty-horse power engine is preferable to a sixty?—I think the sixty-horse is preferable if the vessel is built a little finer with a foot less breadth; a good engine with a sixty-horse power would drive that vessel as fast as the Sovereign with her eighty.

What would be the effect with regard to heavy seas and bad weather?—She would be equally calculated for the bad weather. We find of the Sovereign and Meteor, the Sovereign is the best vessel going head to wind from her power; but in blowing weather, with canvas, the Meteor is certainly superior. When we were going round to Holyhead from the River, we had some very bad weather off Beachy Head, and while the Sovereign was labouring in a sea, both under canvas, the Meteor shot by us; I thought she would have been down upon our deck; almost when we got round the Lands End, the weather was so extremely bad that we had hardly head-way, and we thought we should have been driven up to Bristol, fortunately the wind moderated and we were able to get into Milford. We were so anxious to get round the vessels, that the Meteor left the River in a very incomplete state; we had shipped several people in the river Thames who were sick and useless, and when we came to the very worst there were only four people on board the Meteor who could stand on their legs; considering all circumstances this could scarcely be taken as a fair trial, but on the whole the Meteor did as well as the Sovereign.

Both vessels put into Milford?—Yes. The Postmasters General, I believe, have some idea of trying whether what are called Scotch engines may not be better for a third vessel, in case of one being built; they are more simple though perhaps not quite so efficient, not so liable to derangement, and are consequently better for a heavy sea; and if the vessel is properly built, I do not think there can be any great difference in the rate of speed.

Inform the Committee in what the principal difference consists between the Scotch engines and Mr. Watt's.—I am not able to answer that question.

Is there not a difference in the paddles?—Yes, there is a difference in the way of fastening the paddles; we have tried the principle of the Scotch wheel at Dover, with machinery of Boulton and Watt, but we do not find it makes any material difference.

Have any of the Scotch vessels gone through the winter?—I believe not; the Rob Roy has been running occasionally between Dover and Calais in the winter.

You have a post-office steam packet between Dover and Calais?—Yes, two.

Have they gone through the winter?—One of them has gone through the winter, the other has only lately gone round, but from their draught of water, and the difficulties of the harbour on each side, Calais and Dover being dry harbours, and their not being able to run into them at all times, the captains have not thought it prudent to go in such weather as the Holyhead packets have put to sea in.

Are they built on the same principles as the Holyhead?—The wheels of one are not upon the first motion; there are spur wheels, but we find that will not do for sea-way, the crank is so much more simple.

Has any thing been done to assist the packets at Holyhead to get into harbour in bad weather?—A gun has been sent to the South Stack, and each of the steam packets is supplied with one, that in foggy weather, if they do not exactly know where they are, they can fire and the man at the South Stack answers them.

Is there the same arrangement at Howth?—I believe not.

You have tried an experiment at Holyhead, with an engine upon an entirely new construction, in the Tartar packet?—We have.

What has been the result of that experiment?—I must first say that the inventor has not carried into effect every thing he intended, therefore the trial may be said to have been made while she was in an incomplete state. The Tartar, as an experiment for our Holyhead service, has entirely failed; indeed Mr. Broderip admits she is not calculated for the Holyhead station; his object was to make the machinery auxiliary to a sailing vessel, that she should have all the properties of sailing with the power of applying machinery if the wind was contrary.

Then the failure has been more owing to the attempt of connecting the sailing power with the steam than any failure in the principle of the engine?—The engine is faulty in part certainly.

What is the postage on a letter from London to Dublin?—Fifteen pence.

What part of that is for crossing the Channel between Holyhead and Howth?—Two pence.

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What

G. H. Freeling,
Esq.

(21 March.)

G. H. Freeling,
Esq.

(21 March.)

What is the postage from London to Holyhead?—Thirteen pence.

Might not a vessel, constructed with all the properties of sailing, with the Sovereign's bow and the Meteor's quarter, have a steam engine put into her, and answer as well as the Meteor or the Sovereign?—Certainly, as far as the hull is concerned; the object is velocity through the water, whether the vessel be propelled by machinery or by canvas.

Are the boilers in those Holyhead packets high pressure or low pressure?—Low pressure. Mr. Watt, I believe, was the inventor of the original high pressure engine, but afterwards abandoned it on account of the danger.

No cases of late have happened of accident from the bursting of boilers?—Not that I am aware of.

The bursting of the boilers in either of those two packets would interfere with the action of the steam engine, but would not be attended with dangerous consequences to the crew?—The boiler would not burst, it would rend or open.

There could be no explosion?—No.

That arises from its being made of wrought iron?—Yes.

What precautions are taken to prevent accidents by fire on board the post-office steam packets?—There is a greater space; the engineers can get round the boilers and under them and over them; in addition to the outer case round the bottom of that part of the funnel which is near the deck there is a third iron flanch which comes from the funnel to the deck.

What number of boats is there in each packet?—There is only one on board at present.

It having been observed that the boat was on the deck, was that the proper place for her?—No; the proper place is hanging from the stern—there are davits for the purpose there.

Under whose care are the ladders at Holyhead from which the passengers embark or disembark from the packets?—I believe the commissioners of the pier.

How many feet at low water is it from the top of the pier to the deck of the packet?—Fifteen or sixteen feet, I think.

What description of ladder is made use of?—It is a very indifferent ladder; it is in my opinion scarcely safe.

Jovis, 28^o die Martij, 1822.

George Henry Freeling, Esq. again called in; and further Examined.

G. H. Freeling,
Esq.

(28 March.)

ARE there any alterations or additions you wish to make in the evidence which you gave on a former day?—I wish to explain some parts of it as to the steam packets, in addition to the securities I mentioned against fire; we do not put any fuel or coals over the boiler, which was the cause of the Robert Bruce catching fire and being burnt. They used to stow their wood and fuel over the boiler, which became ignited in some way; it never is done with us, it is positively forbidden.

Where are they stowed?—In cases made for the purpose in the engine-room.

Are the cases lined with iron?—They are iron cases. The other point was as to the Ivanhoe. I was asked whether she was so strong as the other vessels; the answer was simply, "No." But she is not three years old; she was inspected at Liverpool a short time ago, and I think she is as strong as any of the steam vessels, except those on the Holyhead station.

Was any thing done to her to make her stronger?—She was inspected and made as strong as possible under our direction.

What timber is she built of?—Fir.

Then it is the difference arising from the different state of the two sorts of timber?—Yes; and the difference of her filling in; she is not filled in as the others are.

Besides that is there a difference in the timber?—Yes.

Do you look upon it that the superior strength of the oak counterbalances the weight?—I think the weight is a great advantage. A question was also asked as to the practice of begging for money. I have ascertained that there is certainly no instance of the packet seamen having done this at all. There are men who were formerly in the packet service who attend as porters on shore, and being out of employment follow passengers and ask them for money.

You

You do not now allude to the steward?—I now allude merely to the sailors.
Is there any code of regulations as affecting the passengers delivered from the post-office?—There is no written code of regulations.

*G H. Freeling,
Esq.*

(28 March)

What accommodation is there on board the Royal Sovereign as to births?—There are twenty altogether.

How many rooms are there?—Two; one for ladies and one for gentlemen.

How many births are there for ladies?—Six.

The cabin appropriated to gentlemen is fitted up with sofas?—There are two sofas.

Is there any rule or regulation which prevents ladies going into that cabin if they find it convenient?—None whatever; but we rather wish to keep the after-cabin distinct for ladies, because when they are in bed they do not wish strangers to be there, but we find it impossible to do that. Gentlemen going over with ladies say, "keep me out if you dare; my sister, daughter or wife is there, I will go in to take care of them."

Is there any regulation that if a lady was to wish for a pillow to support her in her carriage that she could not have it?—I have never understood so; there is a regulation that the stewards shall not bring the beds upon deck; we have had a great number of beds spoiled from being brought upon deck in bad weather.

Captain William Rogers, called in; and Examined.

You are the commander of one of the Holyhead packets?—I am.

Be so good as to acquaint the Committee in what manner the communication has been kept open between Holyhead and Dublin by the steam packets, and what has been the success of the experiment of establishing them on that station.—We have done every thing that could be done by steam boats, and they will go no doubt when a sailing vessel will not; that has been proved.

*Captain
William Rogers.*

Have they fully answered the expectations you had formed of them?—Fully so; they have exceeded my expectations.

Have you had full trial of them with respect to gales of wind?—Yes, in every way; I crossed in the Meteor on the 5th of February, in the heaviest sea I have seen during the eight years I have been on the station.

Have the steam packets sailed regularly the whole winter?—Except a very few days; I have seen them go several times when the sailing packets could not.

What have you considered to be the sort of weather when you say the sailing packets could not go?—I went in the Meteor on the 5th of February, when no sailing packet could carry canvas, they must have laid to; I left at nine at night, and arrived at six the next morning.

Was it blowing in the way you describe at the time of your leaving Holyhead?—Yes.

The sailing packet would not have attempted, under the same circumstances, to have gone to sea?—No one could have gone.

How came you to sail at nine o'clock at night?—There were two mails on board; the Tartar put back with the mail, and I took her bags.

In what point was the wind?—South-west and by south; no sailing vessel would have got under weigh at the time; the Chichester sailing packet came over the same day from Howth, with a three-reefed mainsail, storm jib, and could not bear a foresail, and it blew harder when we started.

How long was the Chichester coming over?—About seven or eight hours.

Why did you go at nine at night?—To prove what steam would do.

The Tartar had put back, and you had taken the mail she could not take?—Yes.

Are you not perfectly satisfied, from the experience you have had, that the steam vessel you command is capable of performing what no sailing vessel can do?—Yes.

You mean the steam vessels built for the Holyhead station?—Yes.

Have you not often left Holyhead, during the winter, when no sailing vessel could get out?—We have.

Have you discovered that the steam vessels you command, built under the inspection of the Navy Board, are as safe as any vessel you ever navigated?—Certainly.

Is there any danger, in your opinion, to be apprehended from them as steam vessels?—No.

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In what way is your safety provided for in the shape of valves?—We have safety valves, but I cannot say how many pounds to the square inch.

If at any period the fire should elevate the steam to such a pitch, has not the engine the power of relieving itself?—It has.

Have you observed that, in crossing the Channel with an adverse wind, you accomplished your passage under easier circumstances than you could possibly do in a sailing vessel, inasmuch as you were enabled to go head to wind?—Yes, much easier.

Do you find that a steam vessel is capable of making her passage much sooner, under all circumstances, than a sailing vessel?—Yes, in one half of the time upon the average.

With the wind at W.N.W. blowing hard, and leaving Holyhead in a gale of wind, you have found a steam vessel has been much easier than a sailing vessel?—Yes, their extreme length overcomes the short sea.

Do you, with such wind, steer your course direct?—That depends on the weight of the sea and state of the tide. It is a general rule with me, when the vessel will steam from three knots to three and half, and the vessel not labouring much, to make a straight course; if otherwise, to sail her until I smoothen the water, then down all sail and steam right for the port.

Have you found in blowing weather that the vessel works at all either inside or out?—No, not at all; I do not see it in the least, not a single thing, she is as solid as a wall.

What do you attribute that principally to?—To the diagonal works, and to the mode of fastening.

Have you tried the coal tar?—Yes.

How long have you used it?—Ever since she has been built.

What is the longest time you have ever been on the passage?—Fifteen hours is the longest I have been.

Do you conceive that any improvement can be made in the construction of a steam boat should a new one be ordered?—Yes; I think we could make improvements.

State what they are.—I do not think too fine a vessel will do; when she is so very fine she will not answer in those seas; the bow of the Meteor is too full and the Sovereign's quarter is too heavy.

What improvement could you suggest to the Committee to do away that?—In building a steam boat she ought to have a fine entrance and her bow to flar off, not to shove any water before her; any water she shoves before her must be an impediment to the sailing; she should have a fine entrance, a good line of bearing, and her transome pretty square, and not too high; the more you can stop a vessel from pitching and rolling the quicker she will go; I found with regard to the Scotch boats that all their transomes were too high and too narrow, the consequence of which is, that with a head sea they go with their stern under; I have seen them go boat and every thing under; the transome being square and low and fine under, so as to give them a right line of bearing, will stop their pitching and rolling and make them easy on the sea and add to their speed.

You attended the building of these two vessels, the Meteor and the Sovereign, in the river?—Yes, I did.

Describe generally the cause of their great strength.—They are filled up solid to the floor-head, caulked inside and out, having no tree nails, but bolted and copper nailed. The bolts are driven upon a ring and clenched at both ends.

Have you Spanish heads?—Yes; then there is the diagonal fastening.

Describe what that is.—The diagonal fastening is a plank three inches thick fore and aft, three and a half thick midships, and nine wide leading from the floor-head to the shelf, taking in five or six timbers; and then it is filled by truss pieces into triangles, so that it is almost impossible that the form of the vessel can alter.

Have not these vessels proved themselves decidedly superior to any other steam vessels?—We have never seen any other steam vessels that would go with them; they are very superior to any others in strength, safety and speed.

Have you examined many steam vessels?—I have been on board several; the Majestic, the Superb, the Ivanhoe, and the Talbot, and many others in London river.

Have you sailed in any of them?—Yes, in the Superb and the Majestic from Greenock to Liverpool; Talbot and Ivanhoe from Howth to Holyhead.

Did

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Did you go to Greenock for the purpose of inspecting the steam vessels?—Yes.

Did you see and examine those other vessels previous to the building of the two Holyhead packets?—Yes.

Have any other steam vessels navigated and kept at sea all the winter?—None. The *Majestic* and the *Superb* had some difficulty in making their passages last October, and were laid up for the winter. I remarked on board the *Majestic* when I was in her that she was very tender.

Very crank?—Yes, very crank.

If you were consulted with respect to building a new vessel, what other alterations would you propose besides those you have mentioned with regard to the bow and the stern?—Their main beams might be put closer to the wheel, and their boiler placed lower, and the engines nearer together and more in the centre.

The engines on board those vessels were made by Boulton and Watt?—Yes.

Have you seen the Scotch engines?—Yes, I have.

Are you able to inform the Committee which engine is best?—I should prefer Boulton and Watt's engine to any other; their boilers are very superior, and never short of steam. Boulton and Watt had been accustomed to vessels for rivers, and the engines were made rather too slight for our Channel; the shaft was hollow, and of cast iron, but they have been replaced by solid shafts.

Have those vessels ever been disabled except when they broke their shafts?—They have broken their cross-heads, which are soon replaced. I broke two, and they were replaced immediately; the cross-head of the piston, and the cross-head of the air-pump, which were replaced with wrought iron spare ones on board.

Were those replaced at sea?—Yes; we stopped one engine and worked the other with the wind right a-head, and in five hours the engine was repaired and worked. There is a difference of opinion between wrought iron cross-heads and cast iron; they say it is better for the cross-heads to break than any thing worse, which is the beams, or the top of the cylinder to be knocked off.

Then, in point of fact, since the month of May last, when these two vessels were put upon the Holyhead station, they have never been disabled, except in those two instances when the shafts broke?—No; and then they could have made their passage.

You are able always to keep one engine at work out of the two, unless the shaft fails?—Yes; you may always work one engine, unless the shaft breaks. The shaft is the only part common to both engines, and therefore unless the shaft is broken, the two engines are not disabled.

Comparing the *Meteor* and the *Sovereign* with any other steam boats you have seen, are they not infinitely superior both in construction and safety?—Yes; and in speed.

In a gale of wind?—Yes.

Have you ever exhausted your fuel?—Never half.

Do these engines consume much less fuel than the engines of other vessels you have been on board?—I should think less than half.

What is the rate of consumption by the hour?—We use about eight hundred weight in the *Sovereign* per hour; in the *Talbot* and *Ivanhoe* they each consume about fourteen hundred weight.

What does the *Meteor* consume?—About five hundred weight.

What are the respective powers of the *Sovereign* and the *Meteor*?—The *Sovereign* has two forties, and the *Meteor* two thirties.

Do you find the *Sovereign* a superior vessel in consequence of this increase of power?—Yes, in going head to wind; but there is a great deal owing to the *Meteor*'s bows; she will not go head to wind.

Which vessel would you prefer in a gale of wind?—I think the *Meteor* is the best boat in a gale of wind.

Generally speaking, would you prefer an eighty to a sixty horse power in a gale of wind?—No; but I think the *Sovereign* is rather overpowered; if you were to put two forties in her again you must put in much heavier engines. The advantage the *Sovereign* has over the *Meteor* is going head to wind, but the *Meteor* will beat her with her canvas. The *Sovereign*'s canvas steadies her and lightens the engine, but does not much help her speed.

Supposing you were choosing your own vessel, what plan would you prefer?—I think you might build the vessel a little smaller for two thirties; if we were to build for two forties we must build a larger vessel than the *Sovereign*, and she is full large for the station.

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What size would be the best size for vessels for the station, and what power?—I think the Meteor is very near the size, with the improvements we could make upon her.

Under all the circumstances of your passages, have you not found the motion of the steam boat much easier than the sailing vessel?—Yes; it is not to be compared to it.

In a gale of wind have you found the passengers complain of the motion?—Yes, they do complain of the vibration; passengers frequently complain on board the steam packets that they were never sick before, but I do not pay much attention to that, for the last passage is always the worst.

In what degree are you able to take advantage of sails in bringing them to aid the steam power of the vessel?—Sails assist the vessel very much; we use them every way, except going head to wind, within four points of the wind.

Do you find them assist considerably in the speed of the vessel?—I have found the Sovereign go as fast in a calm as at any other time. It must not be thought that a steam boat running before the wind in a gale and a heavy sea, that she ought to make the quickest passage, as we are then obliged to shut off half the steam, or great part of it; for should you allow the full power to be on, the wheels running two or three times round without touching any thing between the trough of the sea, and then being brought up all at once, something will probably give way.

And by thus moderating the steam there is no fear?—No; the engine goes as easy as a glove.

Do the sails serve to steady the motion?—Yes; they steady her certainly.

Do you not make just as good a passage with a foul wind as a fair wind?—In a light air of wind we do not mind going head to wind, and smooth water.

Supposing the engines to be out of order when at sea, so as not to be able to use them, have you sails enough to enable you to command the vessel?—Yes. The other day when I hove the Meteor to I stopped the engine, and we were going three knots and a half with the lee wheel nearly under water; we were sounding; it was very heavy weather.

Have you the power of putting the wheels out of gear?—You may unconnect them from the engine and let them run round, or take your floats off; but we cannot do that when the engine is going.

When you broke your shaft what did you do?—I was not on board her then, but I towed her back; I met her about seven leagues from Howth, and towed her back to Holyhead.

How was the wind blowing?—South south-east, fair for Howth.

Do you think she could have got on with the sails?—Yes, and made her passage; but as the mail was sent away by a schooner to Howth, it was better to tow her back, as Holyhead was the only place to repair her.

A shaft has been broken twice?—Yes, twice; once in the other boat.

What was done in the other case?—She was towed back.

Supposing dark weather to come on, the wind blowing hard from the Irish shore, so that you could not have made the land, could you have laid to or sailed the vessel?—Yes, we could have sailed the vessel or have come to an anchor; by putting two cables together which she has on board, she would ride out any gale in the Channel as easy as a glove.

You are of opinion that in the event of the engine failing, with the assistance of sails and the anchor you may always keep the packet in perfect safety?—There is no doubt of it.

In the event of any accident happening to the steam apparatus with a lee shore, what power have you, by sails, of keeping off that lee shore?—I cannot see where there is a lee shore, it must be either over at Dublin or at Holyhead; and if it is a lee shore, then it is a fair wind back.

Have you ever been in such a situation, since you have commanded those packets on a lee shore, that you could not take the tide under your lee bow on one tack or the other?—Never.

Have these packets the same power to go to windward as a common merchant vessel?—Yes, and they will beat a common merchant vessel in sailing.

Have any improvements been made lately to give steam packets more power of canvas?—Yes, there have been.

Explain what they are.—Three more cloths are put in the mainsail, and a very large fore lug; the after one remains a schooner sail.

Will you be obliged to carry more ballast in consequence?—No, we are as stiff

as churches; we take out 12 tons of coal in the summer; there are 60 hours coal on board.

Upon the whole, with the nature of the Channel, the shores, and the power of the canvas you can put upon a steam packet, with the aid of anchors and cables, you feel perfectly secure at all times, though the engine may go out of order?—Yes.

Has it ever occurred to you to lay to for a night at anchor?—No, we never should lay to any where.

Have the packets ever been out a whole night, starting in the morning?—Never; one o'clock in the morning is the latest they have been out; you cannot lay to in a tides way, or ought not so to do; we do not want it; the people get more used to steam vessels now; we can hit the land at any time now, either the hill at Howth, or Holyhead light-house.

Have you guns on board for signals?—Yes, a six-pounder each.

There is a gun at the Stack?—Yes, there is.

Have you found it of any use as yet?—We have had no use for it as yet; we shall want it in the summer, I dare say; I have not the least doubt we shall find it of great service.

Is there any gun at Howth?—No; there are some on the round towers.

Not to assist the packets?—No.

From the superior construction of the Meteor, and the Sovereign having their timbers filled in and caulked, in the event of getting on shore and knocking the keel off, or the planks off the bottom, still the vessel might be saved?—Yes, certainly; there is a very great difference of opinion as to filling vessels in that way.

Have you found those two vessels equally buoyant with any other you have sailed in?—Yes.

Has the great weight of her timbers and materials diminished her power of speed?—No, I think it rather gives them speed against a sea.

Then the inconvenience anticipated from the mode of constructing these vessels has not taken place?—No, it has not.

Are the Committee to understand your opinion to be, that in any weather, however severe, the steam boats will stand that weather as well as any sail boat?—Yes, in any wind; the more wind the better for the steam boats; that is where they show their superiority.

In the heaviest gale that could blow you would rather be in a steam packet than in a sailing packet?—Yes; that is in a vessel of our own construction.

*Captain
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Sabbati, 30^e die Martij, 1822.

Captain William Rogers again called in; and further Examined.

BE so good as to give the Committee an account of your voyage from the River round to Holyhead.—On the 16th of May, blowing hard from the S.W. 3. P.M. I left Gravesend on board the Sovereign, in company with the Meteor steam packet, with seven or eight men on board of each. At 9 anchored in the Downs, blowing very hard; she rode very easy with thirty-five fathom cable in five fathoms water. On Thursday the 18th fresh gales from W.S.W. 5. A.M. weighed anchor and steamed for Portsmouth; wind dead on end. 4. P.M. made the Owers Light; hazy weather. 9. P.M. very heavy gales and thick weather. I asked the engineer what coals he had on board, he told me five hours; we were then obliged to steam in for the land. At 10 made the Nab Light upon the starboard quarter, about a quarter of a mile; shortened steam for the Meteor to come up. At eleven anchored at St. Helen's in six fathoms water, with forty fathom cable; hard gale. On the 19th, 3. 30. A.M. weighed anchor and ran into Portsmouth harbour; made fast to one of the buoys alongside His Majesty's ship the Queen Charlotte; then we were employed in getting coals in, and very bad they were. At 4. 20. got under weigh and steamed out of the harbour, and at 6 passed through the Needles against a flood tide. This day was fine weather, and light airs from the N.W. At 1. 30. P.M. anchored in Falmouth harbour; there we remained a week to clean the boilers, to caulk the decks, and so on. Sailed from Falmouth the 26th, wind N.W. fresh gales. At 5. 30. past the Longships Lights. At 9 in a squall, with heavy rain, the wind shifted to the N.N.E. blowing very heavy and a heavy sea, the vessels going from three knots to three and a half, head to wind, blowing hard. At 7 made Lundy Island, bearing E. by S. passed several vessels lying to; passed a large smack,

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smack, lying to, under close reefed mainsail. At 8 made sail upon the vessel; stood more to the southward into the Bristol Channel, to smoothen the water. At noon more moderate; water smoother; down all sails and steamed for Milford. At 5 anchored in Milford, found several vessels had been out in the gale and obliged to put back; the vessels that had been put back, bound to Liverpool, said they had never experienced worse weather before for many years. On Sunday evening the wind more moderate, and from N. to N.E. At 8 p. m. got under weigh. On Monday, at 4 p. m. arrived at Holyhead.

How many days were you performing this voyage?—Five days, with the wind right a-head down the English Channel and up the Irish.

During that period could any square rigged vessel, from a first-rate down to a sloop of war, have performed the voyage you did in the time you did in the steam boat?—No; it was impossible. In the Downs we passed several Indiamen, and 150 sail there that could not move down Channel, and at the back of Dungeness we passed 120 more.

During that period how did your vessel behave herself, under the circumstances of bad weather and adverse winds?—Nothing could be better, but she rolled a little, and which I think we can cure her of.

What improvement could you suggest to prevent her rolling?—I should take a foot off her beam in the first place, and make her bottom not quite so round, and the engines placed nearer together, and her wheels not quite so wide on the side; they are eight feet wide.

In a gale of wind on a lee shore, do you not think them much safer vessels than any square rigged vessels?—Yes, most certainly; because they can use their steam as well as their sails.

Be so good as to describe to the Committee the exact improvement you would recommend as to the construction of a new steam vessel.—I should make her a foot narrower, and raise her floor-heads a little, take off the roundings, with her engines put nearer the centre, the boilers much lower, and the wheels narrower: I have observed in our vessels with these wide wheels, the lee wheel is a great deal under the water, and the other out; by the width of them it increases the angle; and although a wide wheel is of great advantage in a river, I think it is a great disadvantage in a sea; supposing there were two forty-horse power engines, I would not have more than a seven-feet wheel; ours is an eight-feet wheel, and if there were two thirty-horse power, six and a half, in my opinion, would be sufficient.

Would those wheels have power to give the packets the same speed they have at present?—Yes; we might lose twenty minutes in a calm, but we should gain two or three hours in a gale of wind; that has been tried in this river by the *James Watt*; her paddles are nine feet wide, and with one half of them on, four and a half in length, she was found to go nearly nine knots, and she only goes ten with the whole on; but I must observe, that after you get a vessel to go nine knots, it takes a great addition of power to make her go the tenth.

As to the form and shape of the *Meteor* and *Sovereign*, what improvement would you recommend in a new vessel?—I should recommend it to be a little finer and eighteen inches narrower than the *Sovereign*, and a foot narrower than the *Meteor*.

What alteration would you propose with regard to the bows?—Much finer than either of them.

Have you sufficient experience of the Scotch engines as to be able to give a decided opinion in favour of the engines made by Mr. Watt?—No, I have not yet. I have been in the Scotch vessels several times, and I have seen their steam go down; in one of them the vessel was nearly on shore; it was the *Majestic*; she was entering the narrow passage going into Liverpool, and they let the steam go down; she was nearly on shore in consequence; unless you are constantly firing you can never keep the steam up.

Has that ever happened on board the Holyhead packets?—No; never.

On building a new vessel, would you recommend Watt's engine to be made use of?—Yes, I would, for my own part.

Can you suggest any improvements?—I should make the engine much stronger.

In what respect?—In every part.

What effects have you observed, when on board the Scotch vessels, from the engines?—I have seen fire going up the chimney, and I have seen sparks of fire flying over the deck; there must be a great waste of fuel in consequence; we never

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see that on board our vessels; they come out dearer, but they are cheaper in the end.

At the time you performed that voyage, with the weather you have described, from the Downs to Milford, if that weather had continued twelve months, would any square rigged vessel have performed it?—They would have been a long time about it, probably would have been weeks instead of days; a sailing vessel would not have beat up to Milford as we did in twelve months.

What parts of the engine give way most frequently?—The cross-heads at the top of the piston. If the engineer is not very careful, and allows them to get too hot, you may carry away a cross-head, or if water is allowed to get in the piston, which it does sometimes, being too hot. I think there will be an improvement in that before long.

What time ought to be allowed, in your opinion, for looking over a steam engine in order to keep the vessel as much at sea as circumstances will admit of?—Two or three days. An engine should never lie by longer, because if she was to lie by in the harbour, you would have to set the engine going to keep it in order.

Does it require three days to give an engine a complete looking over?—No; two days, or a day, or two or three hours; it is according to what is to be done to her.

What number of days may a vessel sail, day after day, without a thorough examination?—They might run a week, fortnight or longer, but once a week it would be necessary to examine them.

You recommend she should lie by two or three days, and be examined?—Yes.

Then, on the Holyhead station, it being necessary to send a packet to sea every morning from Holyhead, and another from Howth, in order that the vessels may be kept in order, how many vessels, in your opinion, should be maintained to do the service?—I think you might do it with three, and very easy, with a sailing vessel on the other side; then a vessel would be lying by three days and running six.

With those arrangements of lying by three days and being at sea six, three vessels would just exactly perform the service, and no more?—No more would be required; they would perform the service; nor is it necessary they should lie by three days.

Supposing they sailed six days and laid by three, there would be no day on which they were not at sea or lying by for the necessary time for examination and repairs?—It does not follow that they would want repairs.

Supposing they do lie by three days and are at sea six, it occupies the whole time, there is no spare time?—The spare time would be the three days.

If each packet is at sea six days, and if she lies by after every six days for three days, she would actually upon no occasion lie by more than three days, if allowed to her?—Certainly not, unless there is any thing particular to do to them.

Three packets would just perform the service, and nothing more?—Yes.

But upon a press a vessel would go eight days instead of six?—Yes, we have gone all the winter and summer with two.

Since the Meteor and Sovereign have been at Holyhead, have they not been continually at sea?—Yes.

How many men are there on board?—Fifteen.

What work have the men to do after the packet arrives at either side?—They get the coals in, and clean her.

What time does that take?—About a couple of hours with horses and carriages.

Have you not made many voyages in succession in gales of wind?—Yes, many.

Coming in late after a gale of wind, and having to sail early in the morning, do not the men go through a great deal of hardship while the weather continues bad?—Yes, but they have their night's rest; if a man be in a sailing vessel, and should be on deck two or three nights, he would soon find the difference to a steam vessel.

Do you not think the work is as hard on board the steam packets as the sailing packets?—Certainly not, as regards myself.

As to the men?—Nor as to the men; if a man complains of a steam boat, he must be afraid, or something of that kind. I never read a novel before I was on board a steam packet, and I go down now frequently and read for an hour or two; if a man works hard in the day, he has his night's rest, and a man is never better than when he does his day's work; I have not the anxiety now which I used to have, being up night after night.

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(30 March.)

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(30 March.)

In what way is it decided whether a packet shall go to sea in case of very bad weather?—By the commander and the agent.

What is considered to be weather to keep a steam packet from going to sea?—There may be a difference of opinion upon that; when it is a downright hurricane, and it is impossible for any vessel to stem ahead, we do not attempt it.

Do they go out when the cutters cannot?—Yes, with the wind at N.N.W. which is the very worst wind we have.

Do you go out when a sailing vessel would not?—We have made many passages when a sailing packet would not go out.

Were there many gales from the N.W. last winter?—Yes, several.

Has it been a worse winter than usual?—I have heard it said, that it has been the worst winter for fifty years. Lloyd's have paid more this winter than ever they did.

Have the gales been from the S.W.?—Yes, S.W. and W.S.W. and that generally finishes with a N.W. wind.

Have you had many from the eastward?—No, only one gale.

Which do you reckon the worst gale?—I think meeting with an easterly gale is the worst; there is always a heavy sea upon the shore, the gale does not last so long, but leaves a very disagreeable short sea. Many times after an easterly gale, we have been two days beating over in a sailing packet, which a steam vessel will perform in eight or nine hours.

Have you ever sailed in a heavy easterly gale from Howth in a steam packet?—No, I have not; the Meteor, Captain Davies, entered Howth harbour with a very heavy gale from the eastward, when the Marquis Wellesley went over, and she went in very easy. It was the heaviest sea that had been seen for many years.

Has the harbour at Holyhead been crowded very much with vessels?—Very much; I have seen 120 or 130 vessels there.

Have you experienced much difficulty in getting in or out with the packets?—No; but the Sovereign has suffered some damage with vessels driving upon her.

Is the harbour large enough for the number of vessels that have recourse to it in bad weather?—No, I do not think it is.

Is it not the practice frequently for the Liverpool vessels to run in?—Yes, but when Dunleary is finished, I am of opinion that will be the out port of that Channel. There have been several instances of vessels leaving Holyhead, and have gone there to wait for a wind, which have made their passage out of the Channel whilst the vessels at Holyhead have still been wind-bound.

Have you found any difficulty in bad weather in getting the packets into Howth harbour?—Never.

Have they ever touched ground there?—Very seldom. They are deepening it in the west pier.

Have any of the vessels been damaged by touching?—No; the sailing vessels used to be.

Are there any inconveniences in landing passengers and carriages at the pier at Holyhead?—Not passengers, but carriages. I have seen Sir Colin Campbell's carriage detained on board the Sovereign for twelve hours for want of a crane being in the proper place.

Where is the crane?—Half the pier up one of them is, and the other is down in the jetty.

Where would you propose to put the crane?—About 120 feet from the jetty. There are no fenders, and we run a very great risk of breaking the wheels or destroying the engine, for want of them; no longer back than last Sunday, we nearly met with a very serious accident, by striking the foundation stones at low water; I did hear before Mr. Rennie died, there were orders given for them, but have not heard a word about them since.

Are the cranes in a proper situation at Howth?—Yes; they have got two, and a third, a temporary one.

Where are they placed?—One on the west jetty, one abreast of the Custom-house, and one on the east pier.

Are there fenders at Howth?—There is every thing complete there.

Would not an extension of the harbour at Holyhead, so as to admit the Liverpool traders to come in, be of considerable value and importance?—O! yes.

Have the East and West Indiamen, any port to run into between Milford and Liverpool?—No, Holyhead might be made one.

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In case of an accident in the Channel, where must they go to repair?—Liverpool.
Is there a sufficient depth of water for forming a pier at Holyhead, so as to make it a harbour for the general trade?—Yes; between the point of the salt island and the present pier, there is a large rock, which would be a good place to run a pier from, with plenty of water to take any vessel.

And such a pier would give perfect protection to the largest vessels that come in?—Yes.

How long would such a pier be?—Half the length of the other.

In what manner are horses put on board?—Either by boxes or slings.

Is there a box always at hand?—Yes, one on each side.

What sort of accommodation is there on board for horses in the steam vessels?—The fore-hold will contain six horses.

What floor is there?—It is a wooden floor and it is battened; a horse would find his feet better upon ballast, but you cannot put ballast there, for if a horse was to kick some of the stones into the engine, it would spoil the engine.

How many sailing packets are kept in addition to the steam boats?—Two.

Do they sail every week?—No, they are changed monthly; there is the Chichester and the Pelham.

Supposing the sailing packets were to sail one from each side on particular days might not this give a better accommodation for the carriage of horses?—No; nor will people go in them.

Is the *Ivanhoe* built sufficiently strong to stand the winter season at Holyhead?—She is not so strong as ours, but she is as strong as other vessels in general.

Is she strong enough to go through the regular service of the station at Holyhead?—While she is new she is; she would not run long.

Is she made of fir or oak?—Fir.

What precautions have been taken on board the *Meteor* and *Sovereign* to prevent accidents from fire in the arrangement of the furnaces and boilers?—There is water all round them, and they are kept three feet from the bottom, about fifteen inches from the side, and twelve inches from the deck; we are differently constructed from others, and it is quite impossible that any accident can happen, there is water under and on the sides of the fire places; in those boats that are fitted up upon the Clyde there is nothing but brick and mortar below the furnaces, we have iron.

Martis, 2^o die Aprilis, 1822.

Captain William Rogers again called in; and further Examined.

IN the event of building a new steam packet, what improvements would you suggest in respect to the build, the engine, the sails, and to the interior arrangement of her?—I think I should build her in the same manner as the others are built, on Sir Robert Sepping's plan as to mode of fastening, diagonal fastening, &c. &c. only a little finer at each end, and one foot narrower than the *Sovereign* and *Meteor*, to be 95 feet in the keel, 105 or 106 upon deck, and 19 feet in the beam, about 180 tons, her transoms square, and not very high out of the water. The improvements in the engine would be to make them a little stronger, and the boilers a little longer, keeping them more from the side of the vessel, so that the heat might not affect her, and more room to go round them, and to put the boilers lower down.

What advantage would you get by putting them lower?—It would help to prevent their rolling. The *Talbot's* boilers are a little higher than the *Ivanhoe*; by putting the *Ivanhoe's* lower down, found she did not roll near as much. I would have the two main beams put close to the wheel, which will reduce the weight very much and strengthen and make the vessel much easier, as by being so far asunder adds great weight, and acts as a lever. There should be twelve paddles about seven feet long and nineteen to twenty-one inches wide. The engine should be something between sixty and eighty horse power, but this must depend upon the fineness of the vessel, and the water she will draw. If the engine is to be made much stronger, in that case we must not go further than two thirty horse power engines, as then the weight might be too much. I should recommend, with regard to the sails, a large lug forward,
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*Captain
William Rogers.*
(30 March.)

*Captain
William Rogers.*
(2 April.)

*Captain
William Rogers.*

(2 April.)

and a jib and a fore and aft mainsail; and in case any thing should happen to the engine, I would keep a square topsail on board, and a gaff topsail aft, but not to be used except in case of necessity.

You would also be able to set top-masts?—Yes.

Mr. James Brown called in; and Examined.

*Mr.
James Brown.*

You belong to the house of Boulton and Watt?—I have been agent for them some years.

Did you put up the engines on board the Meteor and Sovereign steam packets?—I superintended their erection.

What parts of the engines most frequently fail?—We generally consider the working parts, the cross bars, the side rods, and the side beams.

To what do you attribute the cross bars having broken on board these vessels?—In some instances from want of caution on the part of the engineer, and in other cases from stress of weather.

Were they made of cast iron or malleable iron?—Hitherto of cast iron; they are now made of wrought iron for sea vessels.

Have you put engines into any other vessels?—We have put engines into most of the vessels on the river Thames, the Dover station and Leith.

Have accidents happened frequently to those vessels?—Upon the Leith station one or two cross bars have broken, and that was entirely from want of caution on the part of the engineer in starting the engine; the other vessels were the Dasher and Arrow on the Dover station; there was one accident of a cross bar breaking in the Dasher.

Was that from want of caution?—I cannot say that.

Have accidents happened to vessels in the river?—In the first instance there were three or four little breakages, but subsequently they have gone on very well.

Has any other part of the engines of the Holyhead packets failed?—A shaft was broken, I think the crank shaft.

Was it made of cast iron?—Yes; and I believe its failure was attributed to there having been some screws drilled into the shaft to fasten on the risings for eccentric circles, it was considered that these wounded the shaft, as it broke up that part.

Have the side beams failed?—They are called side beams or main levers.

Have any of them failed?—Only one in the Meteor.

Is that made of cast metal?—Yes.

What would be the effect of making the whole engine as strong as possible, by using nothing but malleable iron?—I do not conceive you could make an engine without being liable to break; there are some parts so small that they must give way, and it is better the most insignificant parts should fail, than some of the principal ones, because they are easier repaired.

Is an engine liable to that extraordinary pressure upon it, under particular circumstances, that it is better to have some part that would yield?—I should think so; for instance, it would be better for the cross bar to break than the side beam, and if not either of those two, that some of the cutters or straps of the side rod should go.

You mean that it would be more easy to repair?—Yes; but if the engine-man sees any thing going wrong he has only to let off the steam.

Can those repairs be made at sea?—Not well; but there are generally duplicates on board of those parts liable to accident. You could not well straighten the bent parts of wrought iron at sea.

In case of constructing a new engine for a Holyhead packet, can you suggest any improvements?—Merely in respect to making the materials stronger and heavier. I conceive the construction of the engine is almost incapable of improvement as it now is.

Would you make any alteration in the arrangement of the boilers?—It would be better to lower the whole machinery together, bring the engines nearer the centre of the vessel, and let the boiler rest upon the keelson.

Would you require more room than was granted in the Sovereign and Meteor?—Yes; it would be better we should get round the boilers entirely, they could then be painted every month, which would be a great advantage, for the action of the salt water is very detrimental to the iron; they ought to be painted every three weeks.

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or every month; where a boiler will not leak with fresh water it will with salt water; and it forms incrustation upon the surface by exposure to the atmosphere; they should be pumped out, and frequently cleaned.

Mr.
James Brown.

(2 April.)

How long would it take to paint a boiler?—Half-a-day.

What number of voyages may an engine go, supposing the distance to be each voyage twenty leagues, without looking over and making a thorough examination of it?—I should think the engineer generally looks over his engine every morning before he starts to see that every part is properly oiled, and that every screw and joint is tight. If so inspected, once a fortnight would be sufficient to examine the packings of the slides and pistons.

Supposing the vessel to finish her voyage late in the evening, and go to sea again early in the morning, would it not be necessary to lay her by occasionally to examine her?—I think it would be an advantage to the service to have a spare vessel to perform the duty while repairs were being done to the others, and overhauling the machinery.

Would it not contribute to the preservation of the machinery to have that overhauling take place at particular periods after a certain number of voyages?—Certainly.

What time would it take to overhaul an engine completely, to ascertain whether she was in any respect injured?—If there were no repairs to do I should think two days would overhaul all the packings about it, even doing it leisurely; if exertion was required it might be done in half the time.

Would you make the paddles for a new engine different from those put to the Holyhead packets?—We should make them the same as for the Leith vessels, they are made with wooden floats in one piece, having three sets of arms, and the bolts are of a peculiar description, which allows the paddles to slip from the outer end of the arm towards the centre of the shaft, by which means a vessel may use her sails the same as any other vessel; should any thing give way, there would be nothing but the arms in the water.

What time would it take to get rid of the paddles?—There would be only four or five to get rid of; the four topmast paddles would be slackened, and fall towards the centre of each wheel, the wheels would then be turned round, and the bare arms would be in the water.

How would you steady the wheels to enable the men to work upon the paddles?—By lashing the wheels fore and aft with tackles.

Have you not some contrivance for engines at work on shore, so that if they become exposed to any sudden violence, they stop themselves?—Pumping engines have.

Have you been able to apply the same principle to engines on board vessels?—I do not conceive that could be well done so as to act of itself, the engine-man should take the steam off, and disengage the eccentric, when he sees any accident likely to occur.

Is it not for want of some such precaution that many of the accidents have happened?—Perhaps in some cases it may be so, but I should apprehend it depended more upon the engineer than any thing else, he should never quit the engine room.

What circumstance is it that chiefly occasions that sort of excessive violence which contributes to injure and break the engine?—Any of the working parts getting loose, any of the screws getting between the finer parts, or the water getting upon the top of the piston in starting the engine.

In what way can the water get upon the top of the piston?—It is from the condensed steam that forms from the boilers after the passage is over, it gets through the steam pipe to the cylinder and condenses there, perhaps to the depth of 18 inches on the top of the piston, and if the engine is started suddenly without it being cleared away, it has not time to get through the thoroughfares.

What is the consequence of that?—The consequence is, that it is jammed between the top of the piston and the under side of the cylinder cover, and risks the breakage of some part; as water will not compress, something must give way, and the weaker parts of course will go first.

Is the City of Edinburgh steam vessel employed to go from London to Leith?—She went there during last season.

For what months?—I think on the 24th of June I first went down with her.

When did she stop?—I cannot say positively, I think the beginning or middle of October.

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Was

Mr.
James Brown.
(2 April.)

Was she exposed to many gales of wind?—Her first passage was extremely rough, we were eighty-four hours making the passage.

What is the shortest time she made the passage in?—I think fifty-eight hours.

What is the distance?—We reckon it 450 miles, and I believe that is near it.

Do you take enough coal with you?—Yes, they have a sufficient supply in the coal boxes, and for a third of the passage more.

Why did she not continue to go through the winter?—I suppose she would not have paid, she is a large vessel of 400 tons.

Was she strong enough?—She was built at Blackwall yard, and that is quite enough to say she was sufficiently strong; the floor timbers were about 12 inches square.

What was her tonnage?—401 tons, the length upon deck 143 feet, and 14 feet depth in the hold.

Is she of a similar construction to the Holyhead packets?—She has not the diagonal timbers; she is built the same as other merchant vessels.

What precautions have been taken in the arrangement of the furnaces on board the Holyhead packets, to prevent accidents from fire?—I hardly think it is possible that fire can take place without great negligence, because the furnaces are completely surrounded with five inches of water round every part, and it is only in raking out the fire, and neglecting to water it, that any accident can take place; it is raked out upon an iron floor.

No rolling of the vessel could throw the fire about?—No; she must be pitching to a great degree, if that was to take place.

How are the coals carried?—They are in boxes in front of the boilers, so as to be right and left for the fireman.

Are those boxes cased with iron?—They are made of iron entirely.

Can a body of water be let in from above, in case of an accident by fire from neglect?—No; but there is a hand pump in the engine room to be used when they are filling the boilers, and they can get water enough from that; in the new Leith packets we have put jet pipes, the same as fire engines have.

Could you put these jet pipes on board the Holyhead packets?—Nothing could be easier.

What are the precautions taken to prevent accidents from boilers bursting?—I can hardly conceive on board these vessels, where condensing engines are used, that it is possible that such a thing could take place, they are generally provided with two safety valves, and the steam used is about from two and a half to three pounds pressure upon a square inch, at which pressure it blows off by the safety valve of its own accord.

How are those safety valves arranged, so as to be at all times operative?—Boulton and Watt have made them for many years in the way they now are, inaccessible for any person to load them by putting additional weight upon them; I have seen the Scotch engine men, in starting their engines, place their feet upon the safety valve.

Suppose by any accident the safety valve was out of order, and the pressure became too great for the strength of the boiler, and it was to give way, what would be the effect on the boiler?—Supposing such a thing, which I conceive is impossible, that the safety valves should get choked, the steam would come off at the feed pipes.

It would not give way under any circumstance?—No, not even though the valves were choked, the pressure is so extremely small; the boilers are calculated to sustain fifty times the pressure required of them.

If any part of the boiler, by length of use, became very thin, and gave way, would it fly or rend?—Merely rend, if malleable iron.

Were not the accidents that happened from boilers, sometime ago, owing to their being made on the high pressure principle, and being made of cast iron?—Yes, they were.

When made of cast iron, and the pressure too high, they gave way, and the metal flew?—Yes, just like a shell.

Malleable iron tears and rends?—Yes.

Without flying and doing injury?—Yes.

Have Boulton and Watt made any improvement in their engine since the Holyhead packets were built last year?—Not that I am aware of, the principle remains the same as it was when it left the late Mr. Watt's hands; the construction of the engines

engines has not varied since the Meteor and Sovereign were built; they have made them stronger and added malleable iron in parts where cast was used.

Those were the first vessels that had engines for the sea from Boulton and Watt?—Yes, they were, and they are the first vessels that ever ran all the winter.

What quantity of fuel do they consume upon any given voyage?—I think the experiments made in the river with the Meteor showed that she consumed about seven bushels per hour, rather under, she was then working above her full speed; the Sovereign I think was from nine and a quarter to nine and a half; the Meteor has two thirty horse engines, and the Sovereign two forty horse engines; the latter when using that quantity of coal was going about nine miles and three quarters through the water per hour.

What time does this give for each ton of coal for the Meteor?—A bushel of good Newcastle coals is reckoned equal to a hundred weight of Scotch coal; so that it comes to very nearly the same thing; the Scotch coal generally burns very free and so does the Staffordshire, but the bushel of Newcastle coal is equal to a hundred weight of either.

Do you know the proportions of the Whitehaven coal to the Newcastle or Staffordshire?—No, I have no certain knowledge whereby I could speak of it.

What is the ordinary weight of the bushel of Newcastle coals?—The standard bushel should weigh eighty-eight pounds; the best Walls End, I have found them eighty; and the Wylam, seventy-seven; I found that by actual weight the specific gravity of the Wylam coal is much under that of the Walls End, the latter is not good for working engines.

What description of coals is the best for those engines?—The best coal we have been able to meet with is the Halbeath or Inverkeithing, from a place in Fife called Inverkeithing.

What is the peculiar quality of them?—Burning free and becoming a complete white ash without caking upon the fire bars.

Is it necessary to have a coal that ignites very quick?—Yes, if it does not cake afterwards. It is a great object to get good coals: in the first passage that I went with the City of Edinburgh from London to Leith, the coals were very indifferent and we were obliged to clear the fire every four hours.

Did you take the fires out?—Yes, took them out one by one completely; in coming back we had a description of coal called Halbeath Main, and with them went sixteen hours without cleaning the grates; the sulphur in coals will destroy the fire bars in a short time.

Do you find any inconvenience from salt forming in the boilers?—Yes, when the main hole cover is taken off and they are exposed to the atmosphere, the water then becomes crystalized and renders them very difficult to clean.

Has this been avoided by any plan?—Yes, by constructing pumps or cocks to let the water through the side of the ship without the main hole being opened.

Does that prevent the crystalization?—Yes, quite.

Has the salt water much effect upon the boilers?—It oxidates the iron very rapidly indeed, if it is allowed to lie upon it.

What period will a boiler last, supposing it constantly in use?—On board a steam vessel, I should think from four to five years with care; it is the only part of the machinery subject to decay.

These engines, upon the whole, require a considerable degree of care and superintendence, and skilful engineers?—They certainly do require more care than the land engines; every engine requires great care.

Captain John Percy called in; and Examined.

You command a steam packet on the river?—Yes, from London to Margate; the Hero.

Have you commanded any other vessel?—Yes, the Victory, belonging to the same company; I commanded the Victory for three years; the Hero was built last year.

Do you go through a good deal of sea occasionally?—Yes, off the Margate sands, when it is blowing from the northward and eastward on the top of the tide, she being such a large vessel, feels it more.

What is the tonnage of the Hero?—427 tons.

What is the power of her engine?—Two engines of fifty-horse power.

Who are the engines made by?—Murray and Fenton, of Leeds.

*Mr.
James Brown.*
(2 April.)

*Captain
John Percy.*

*Captain
John Percy.*

(2 April.)

Where was the vessel built?—At Rochester.

What months in the year have you been running these vessels?—We begin about the latter end of April and run into October, about the middle of October; I have run into November in one year, the 14th of November.

What engines had you on board the *Victory*?—Two twenty-fives.

By whom made?—Mr. Dickson, of Holland-street, Blackfriars.

Are you acquainted with Boulton and Watt's engines?—We have not any one in our concern; I am acquainted with vessels that run with them, and I rather think they are the best; they have not had so many accidents as we have.

What sort of accidents do you allude to?—First, the cross-heads in the *Hero* went away twice in the last season, and several of the bolts and the steam pipe went; now we have got copper ones in the room of cast iron.

From your experience in conducting those vessels, can you suggest any improvement that can be made in them, in respect of the engine or the vessel?—In respect of the vessel, we should improve if we had but half the projection work; in consequence of their being such an immense hang over, it jars so, enough to shake the vessel to pieces.

In respect of the engine, can you suggest any improvement?—Not as to the engine; as to the boilers, we never find ours last more than two years.

What part gives way first?—The bottom.

What quantity of coal does the *Hero* consume an hour?—Pretty well three quarters of a chaldron or twenty-seven bushels, London measure, per hour; in general, they make away with six chaldron in the passage, that is owing to the want of flues; we have not flues enough; we have four furnaces; it is owing to an error in our burners, that we burn so many coals.

What is the distance from London to Margate?—About eighty-four miles.

At what rate do you commonly go?—We generally make the passage in about seven hours and a half, that is the average passage; one passage I made in six hours and sixteen minutes, with the wind and tide.

What sails do you carry?—Very handsome lugs, fore and main lug and jib, and a square sail when it will admit of it.

You have two masts?—Yes; we used to work them with mizens, but we found they carried so much weather helm, that they did more harm than good; most of our vessels want head sail, and not aft sail.

When in heavy seas, do you find the engines work well?—They jar a good deal when they pitch.

How wide are your paddles?—Eight feet in the centre.

How many paddles have you on a wheel?—We have been trying an experiment last Saturday with twelve, and it answered very well; last summer we worked with sixteen paddles, three and a half feet between each.

Have you ever used paddles wider than eight feet, in any vessel you have been aboard?—No; I believe the *Hero* is the widest of any vessel running; the paddle of the *Victory* was five and a half in one place; the *Hero* worked more with the paddles being further apart, and we lowered them a little.

How much have you lowered them?—The *Hero* was the fastest vessel on the river; we raised them seven and a half inches, and then we were the slowest; now we have raised them four inches, and that will be about the thing.

What made you raise them?—They thought the vessel would go faster and easier.

How much do they take of the water?—About seventeen or eighteen inches.

What does your engine work up to?—Thirty strokes per minute she did on Saturday.

What is the lowest?—Twenty-two; she once did up to thirty-one, but twenty-nine and thirty is about the go.

What is the diameter of your wheels?—Fourteen feet.

Have you ever commanded a steam vessel at sea?—I have been across to Calais when His Majesty went over.

How did she perform her voyage?—Pretty well going, it was fine weather; but she worked very much coming back, it was owing to the width hanging over; she jarred so much, you would have thought the top was coming from the bottom; if it was not for that, she would be the fastest vessel in the water.

How many feet water does she draw?—Six feet four. I have not a doubt had the hang over been taken off we should have done very well. The vessel I have to contend with draws only four feet eight; in smooth water she will do very well, but

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in sea-way she will not do, she rolls very much from want of depth of water to check her.

Where do you carry your coals?—Close to the fire, in two iron tanks, that hold six chaldron and a half; there is a little clap-hatch at the bottom where they keep working down; we carry two stokers.

What precautions have been used to prevent accidents from fire?—There is a set of buckets on board.

What is there under the furnaces between them and the ship's timbers?—Iron plates.

Is there nothing under the iron plates?—No, that is before the furnace mouth.

What is under the bed of the furnace?—Large, stout, heavy iron plates.

Is there no brickwork?—No, none; the greatest danger is in raking the rubbish out after the passage, and not cooling the ashes. She burns such an amazing quantity of coal, and that makes the heat the more, and damage has been done to the timbers from that.

Does your vessel go out every day?—No, there is a day between each passage, one in town and one at Margate, to examine and clean the vessel. We sail from London on the Saturday and come away from Margate on the Monday, and go down on the Wednesday.

You have a day's holiday between each passage?—Yes.

Do you find that time necessary to keep the vessel in order?—Yes; we find all the time taken up; the men are never still.

How many hours, on an average, does your passage require?—About seven and a half.

How many miles an hour does that make?—Between eleven and twelve.

*Captain
John Percy.*

(2 April.)

QUERIES.

SIR,

London, March 21, 1822.

I AM directed by the Select Committee of the House of Commons, appointed to inquire into the Communication between London and Dublin, to send you the following *QUERIES*; and to request you will favour the Committee with such answers as you may think proper to give to them.

Your obedient Servant,

HENRY PARNELL, Chairman.

To

- 1.—WITH what steam vessels are you acquainted; whether used in rivers or in the open sea?
- 2.—By whom were they built, and by whom were the engines made?
- 3.—What is their respective tonnage, and what the respective power of their engines?
- 4.—Have any of these vessels performed winter voyages at sea?
- 5.—Supposing the length of voyage to be 20 leagues from port to port, across a sea exposed to strong tides and heavy gales, how many vessels, in your opinion, would be necessary to be maintained, so that two should sail every morning, that is, one from each port throughout the whole year;—except on days when a strong cutter of 100 tons burthen would be obliged to put three reefs in her mainsail?
- 6.—What description of vessel, as to tonnage, form, strength of building, masts and sails, in your opinion, is the best for sea navigation?
- 7.—What description of engine, as to power, materials, and general form and arrangement, and what description of boilers and paddles, in your opinion, are the best?
- 8.—In what parts do engines most frequently get out of order, or break?
- 9.—Can you suggest any improvements in the present plan of building steam vessels, and constructing their engines, boilers, and paddles?
- 10.—Can you suggest any plan for enabling a steam vessel to use sails, so as to be able to beat to windward, in case her engine should be out of order, at the same time offering but little impediment to her steaming power?
- 11.—In a gale of wind, with a heavy sea, what is the best mode of managing a steam vessel?

THIRD

R E P O R T

OF THE

SELECT COMMITTEE

ON THE

ROADS

FROM LONDON TO HOLYHEAD,

AND

FROM CHESTER TO HOLYHEAD;

&c.

CHESTER ROAD.

Ordered, by The House of Commons, to be Printed,
3 May 1822.

THE REPORT - - - - - p. 37.

MINUTES OF EVIDENCE - - - - - p. 42.

THE APPENDIX: viz.

RETURNS:

- (1).—Number of Days the Packet from Howth has arrived too late at Holyhead for the departure of the Chester Mail Coach, between 1st January 1821 and 1st January 1822 - - - - - p. 45.
- (2).—The Hours at which the Mail Coaches depart from Chester, Liverpool, Manchester, Sheffield, Leeds and York for Holyhead - - - - - ibid.
- (3).—The Hours of Departure and Arrival of the Mail Coaches that carry Dublin Letters by Holyhead - - - - - ibid.

ROAD FUNDS:

- (4).—Answers by Mr. Henry Potts relating to Chester and Northop Roads p. 46.
- (5).—Letter from Mr. Francis Jones, enclosing the Reply from the Trustees of the Holywell, Flint and Mostyn Turnpike Districts - - - - - p. 47.
- (6).—Answers relative to St. Asaph District - - - - - p. 49.
- (7).—Ditto - ditto Conway District - - - - - p. 50.
- (8).—Letter from Mr. Roberts, enclosing Answers relative to Conway Road ibid.
- (9).—} Two Engravings; viz.
- (10).—}

I.—Map of present and proposed Lines between Holywell and Northop on the Chester Road.

II.—Sections on the Road between Bangor and Chester.

THIRD REPORT.

THE SELECT COMMITTEE appointed to inquire into the state of the Road from *London* to *Holyhead*, and from *Chester* to *Holyhead*; into the regulations for conveying His Majesty's Mail between *London* and *Dublin*, and between the Northern Parts of *England* and *Dublin*, and between *Dublin* and the interior of *Ireland*; into the state of the Mail Coach Roads in *Ireland*; and to report their Observations thereupon, together with the MINUTES of the EVIDENCE taken before them, from time to time, to the House;—HAVE examined into the regulations for conveying His Majesty's Mail between the Northern Parts of *England* and *Dublin*, and have agreed to the following REPORT:

IT appears from the evidence of Charles Johnson, esq. Surveyor and Superintendent of Mail Coaches, that the London Mail which now arrives at Holyhead at seven o'clock A.M. might arrive there at half past four A.M. If this was the case, the London letters would arrive in Dublin, on an average, between one and two o'clock on the second day from London. But Mr. Johnson has informed your Committee, it is not possible to afford this accommodation to the Irish public, because the Mail from Chester cannot be brought to Holyhead sooner than seven o'clock A.M. Nor can the difficulty in the way of an earlier arrival be overcome by an earlier departure from Chester than the present time, six o'clock P.M. because this is the earliest hour at which the Mails from Liverpool, Manchester, Sheffield, Leeds and York can be brought up to Chester; and it therefore is wholly to be ascribed to the very imperfect Road from Holyhead to Chester.

The following description of that part of this Road, which commences at the river Ogwen, near Llandegai, about two miles east of Bangor, and ends at Chester, is taken from Mr. Telford's Report of 22d April 1811. "The present Road ascends from the Ogwen, at 1 in 16 and " 10 (Tal-y-Pont Hill), and from thence it proceeds by a succession of " small irregularities by Aber to Penman Mawr: hence it ascends " chiefly at 1 in 16, to 189 feet above the level of the sea, and then " descends at 1 in 15; from thence it continues passing over a number " of irregularities, 1 in 28, 22, 17, 16 and 11, to the hill of Sychenant, " which it ascends at 1 in 8, continued to 543 feet above the level of " the sea; from this height it descends at 1 in 17, 15, 12 and 19, to " the town of Conway..

See Appendix to
Report of Select
Committee on
Holyhead Roads,
Sess. 1811.

“ After crossing the Conway, the present Road ascends a small hill, at 1 in 19, passes to the south side of a tract of low marshy land, which separates the Orme's Head from the main land ; it then, with a very quick bend, turns parallel to this marsh, and continues with a succession of irregularities to ascend at 1 in 22, to a pass which separates another lesser point of land at Llandrillo ; it afterwards goes in a tolerably regular manner for a short distance ; it then ascends at 1 in 15, and immediately descends at 1 in 20 and 11, into a deep dingle, where, after crossing the Colwyn, only 28 feet above the level of the sea, it ascends at 1 in 7, 11, and 15, until it has reached the summit of Penman Rhos, at 360 feet above the level of the sea ; from this elevation it immediately descends at 1 in 31, 10, and 14½ to Llandulas, which is only 19 feet above the sea ; from this point it again ascends at 1 in 10½, and passes afterwards by sundry irregularities, but without any considerable obstacle to Abergele.

“ From Abergele to Holywell, the present Road passes by St. Asaph ; but instead of keeping between the cross land and flat ground, it bends southward, and ascends 1 in 29, 20, 16, 9, 13, 15 and 24, to the height of 360 feet above the sea, from which height it descends at similar rates of inclination to St. Asaph, which is only 46 feet above the sea. From St. Asaph it immediately passes over a hill rising 1 in 14, and falling 1 in 18 to the level of 18 feet above the sea ; from this very low point it ascends at 1 in 18, 11 and 10, to the height of 726 feet, from which it descends at 1 in 22 and 12, and afterwards ascends and descends alternately at 1 in 17, 19 and 12 to Holywell, which in its lowest part is 344 feet above the sea.

“ From Holywell to Chester the present Road is quite as imperfect as in the last division ; it ascends at 1 in 20, 12, 10, 14, 11 and 24, up the Halkin Mountains, to 700 feet above the level of the sea, and descends by similar rates to Northop, which is 334 feet above the sea. It then proceeds, passing through some deep ravines, and ascending and descending alternately, sometimes at 1 in 18½, 12½ and 13 to Hawarden ; from thence descends sometimes 1 in 12½ and 13½ to the flat land adjacent to the river Dee, upon which it continues towards Chester.”

Your Committee have endeavoured to ascertain what prospect there is of any improvement of this very important communication between Holyhead and Chester ; and they find in the first place that the new Road across the island of Anglesea, which was begun about two years ago, by the Commissioners acting under the 55 Geo. 3, c. 152, will be completed in the course of this year, by which the distance from Holyhead to Chester will be reduced to 84 miles. Secondly, they find that the Bridges now building over the Menai Strait and the river Conway, are likely to be completed in the course of next year. Thirdly, in respect of Tal-y-Pont Hill, it appears from the evidence of Mr. Pennant, a Member of your Committee, that there is an opportunity of improving it,

it, by carrying into execution an arrangement which Mr. Pennant has proposed in respect to shutting up a Parish Road (which he has agreed to make in place of one to be stopped,) that crosses his demesne. Mr. Pennant offers to make a new Road at his own expense along the base of Tal-y-Pont Hill, for the use of the public, by which this hill would be avoided, provided that those persons who are interested in the Parish Road will consent to its being stopped. This Parish Road is to pass from Port Penrhyn, along the beach of the coast, to Aber Ogwen, which will make the Road to the village of Aber 480 yards shorter than the Turnpike Road, and this is the only advantage it will have, for it will not be possible to take a loaded cart along it; it seems, therefore, to be very much to the advantage of the inhabitants of Aber to accede to Mr. Pennant's proposal, and thus to secure a good Road to the market of Bangor, while at the same time it will be of general advantage to the public thus easily to get rid of so bad a hill. Your Committee are even disposed to go farther, and say, that as the public interest is so much concerned in this matter, it would be right to introduce a Clause in the Bill, which they understand will be requisite for levying Tolls on Conway Bridge, to give effect to this plan; at the same time they trust that this step may be rendered unnecessary, by a private arrangement among the parties who are interested in the business. Lastly, in respect to the repairs of the Road, Your Committee learn that the several Turnpike Trusts have of late paid more attention than usual to their duty, and have appointed efficient Surveyors. It is necessary to state, that since Mr. Telford made his Report in 1811, Rhyalt Hill, East of St. Asaph, has been much improved by the Commissioners acting under the 55 Geo. 3.

Your Committee have obtained from Mr. Telford, drawings of the sections of five of the most difficult hills between Bangor and Chester, with the lines traced upon them that are proposed by Mr. Telford, for improving them. Your Committee are sorry not to have it in their power to point out any means by which the expense to be incurred can be provided, as all the applications which have been made to Government for aid have been ineffectual; and it having been a condition on which the money was advanced by the Treasury for building Conway Bridge, that no public money was to be required or given for the improvement of this Road: private subscriptions, therefore, and a careful management of the Turnpike Tolls, are the only resources which can be resorted to.

As the main object of improving this communication is the acceleration of the Mail Coach, Your Committee are of opinion that this may be obtained by the ordinary means of making the surface of the Road smooth and hard; and by building good protecting walls, where the Road is, as at present, near dangerous precipices, wholly unprotected. In this way a light, well-constructed, Mail Coach, carrying no more than the usual load of a Mail Coach, might easily travel over this Road, hilly as it is, at the rate of eight miles an hour, after the Anglesea

Road is finished, and the Bridges are built over the Menai Strait and the Conway River. This rate would bring the Coach over eighty-four miles in ten hours and a half; taking therefore the departure of it from Chester at its present time, six o'clock P.M. it would arrive at Holyhead the next morning at half past four o'clock, the precise time at which it is desirable to have it there.

Under all the circumstances of this Road, it appears to Your Committee, that it is not possible to have an instance that shows more strongly the necessity of having the Tolls under a diligent and scientific management. The correspondence conveyed upon it, belongs to no less a matter than the vast commercial intercourse between all Ireland and the Towns of Liverpool, Manchester, Sheffield, Leeds, and all the other great manufacturing and mercantile Towns of the North of England. All the Coals, Cottons, Woollens, Hardware, Salt, and nearly all the Colonial Produce consumed in Ireland, pass through the Port of Liverpool, and the neighbouring Ports; and with the exception of Colonial Produce, actually come from these Towns.

The fifty-nine miles of Road which lie between Chester and the point of junction of the Chester Road with the Shrewsbury Road at Llandegai, are now under the care of no less than seven different sets of Trustees; and although this Road is of so great public importance, it has been suffered to continue in a most inconvenient and dangerous state. There seems to have existed a total insensibility to its defects, notwithstanding the journeys of the Mail are performed both ways by night, and that continual accidents have occurred.

Your Committee are informed, that within the last year some exertions have been made on the part of the Trustees, and that in place of leaving the Clerks and Surveyors to do what they pleased with the Road Funds, frequent Meetings have taken place, and new regulations have been adopted.

Your Committee, however, cannot feel that there exists any security for the continuance of these exertions. They may be the result of a rumour that it was in the contemplation of Parliament to take this Road out of the hands of the present Trustees, or of the fashion of the day of attending to Roads. Constituted as Road Trusts are, Your Committee are of opinion that the Legislature has provided no means by which a Trust can be made to fulfil the duty reposed in them. They may squander all the funds, appoint officers for corrupt objects, allow the Road under their management to become a perfect ruin; still the public have no remedy; but must submit to suffer all the inconveniences belonging to such a state of things. When the present plan of a Turnpike Act was first adopted, and the chief use of a Turnpike Road was little else but to go to market or to church, those only suffered from neglect of duty who were chiefly parties to the abuse; but in the case of great modern Roads, the interest of strangers to the districts

districts through which they pass, is so much greater than that of those who live in those districts, that an entirely different plan of regulation has become not only just, but absolutely necessary.

It was on this principle that Parliament passed the Act, in 1819, for consolidating seven Trusts between Shrewsbury and Holyhead. The result of three years experience has proved beyond all question the sound policy of this measure; and it appears to Your Committee that there is so much resemblance between the circumstances of the Chester line of Road and that by Shrewsbury, as to make it a necessary inference that nothing would be more wise than to consolidate the seven Trusts in the same way which are in possession of the Road from Bangor to Chester.

Your Committee therefore recommend, that a Bill should be brought in, in the next Session, for consolidating these Trusts, framed in all respects upon the precedent of the Shrewsbury and Holyhead Act. They entertain no doubt of the expediency of this plan, and they feel quite confident that the experience of the good effects of it will quickly dispel those prejudices which will naturally at first exist against so new a measure. The Committee do not feel it to be necessary to recommend any higher Tolls than those now by law allowed to be taken.

Your Committee have called for Returns of the state of the Funds of the several Trusts, which they have annexed in the Appendix.

They have also obtained Returns of the hours of arrival and departure of the Liverpool, Manchester, Sheffield, Leeds and York Mails, which they have annexed to the Report. By these it will appear that the various Mails proceed to and from all those important places with the Irish Correspondence directly, without any delays, at the ordinary rate of Mail Coach travelling.

Great inconvenience has also arisen from the state of this Road making it necessary to send off the Chester Mail from Holyhead at four o'clock p.m. as the Packet which sails from Howth at eight o'clock in the morning, arrives frequently after four o'clock at Holyhead. By a Return from the Post Office, it appears, that between the 1st January 1821 and the 1st January 1822, the Chester Mail Coach left Holyhead 147 days without the Irish Mail: but this inconvenience would be completely done away if the Coach could perform the journey in ten hours and a half, for then it may remain at Holyhead till six o'clock in the evening, the time at which the London Mail Coach now leaves Holyhead; and it very seldom happens that this Coach goes without the Mail.

MINUTES OF EVIDENCE.

Jovis, 21^o die Februarii, 1822.

SIR HENRY PARNELL, BARONET,
IN THE CHAIR.

Charles Johnson, Esquire, called in; and Examined.

*C. Johnson,
Esq.*

(21 February.)

YOU are surveyor and superintendent of mail coaches?—I am.

Supposing the distance from the post office in Lombard-street to Holyhead to be reduced to 260 miles, by the improvements now making on the road, at what rate might the London mail be taken over that journey?—I should conceive there would be no difficulty whatever in conveying it at the rate of eight miles an hour, all stops included.

At what hour would that make the mail coach arrive at Holyhead?—The arrival would then be at half past four o'clock A.M. by the London time.

Would there be any difficulty in bringing the Chester mail coach up to Holyhead at that time?—Under the present circumstances it would be impossible.

What correspondence is brought to Holyhead by the Chester mail?—In the first place, the correspondence of the very important towns of Liverpool, Manchester, Sheffield, Leeds and York, and from some towns on the Newcastle road, and from a variety of places connected with those roads.

What is the nature of the correspondence carried on between those several towns and Ireland by Holyhead?—I conceive it to be of first-rate mercantile importance; and the amount of the revenue is of course very considerable.

At what time does the Chester mail leave Chester for Holyhead?—At six o'clock P.M.

At what time does it arrive at Holyhead?—At seven A.M.

In what condition is the road from Chester to Holyhead?—The road has been, on the whole, very much improved of late years, but still is very inferior to the Shrewsbury line; the natural difficulties of course are very great.

Are not considerable improvements still wanting to enable the mail to travel at the rate of eight miles an hour over that road?—It was with great difficulty that I succeeded in inducing the contractors to travel at the rate they now do; and I have had much trouble throughout the whole winter to keep the travelling on this road in any regularity; I conceive that many improvements are desirable before we could be quite assured of regularly performing the journey at the rate of eight miles an hour.

What is the distance from Chester to Holyhead?—Eighty-eight miles by the mail coach time-bill.

This distance therefore will be reduced to eighty-four miles when the new road across Anglesea is made, by which three will be saved?—Of course.

Supposing the bridges completed over the Conway and the Menai, and the road improved between Chester and Bangor, a rate of eight miles an hour would then enable the mail coach to travel from Chester to Holyhead in little more than ten hours and a half?—Certainly.

Then a mail coach leaving Chester at six, the time it now leaves it, would arrive at Holyhead at half past four in the morning?—It would arrive at that time.

That is at the same time at which the London mail would arrive, supposing it travelled the whole way at eight miles an hour?—Undoubtedly.

At what hour does the mail leave Liverpool for Chester and Holyhead?—At half past three P.M.

Would there be any great inconvenience in requiring it to leave at an earlier hour?—I conceive it would be felt so at Liverpool; and I am sure it would be much complained of.

Would it in any degree derange your post office regulations?—It would not disturb any regulation at the post office.

At

C. Johnson,
Esq.

(21 February.)

At what time does the mail leave Manchester for Chester and Holyhead?—At half past one P.M. which is half an hour later than a short time since; an extension of time had been applied for by the Chamber of Commerce at Manchester, and we were very glad of the opportunity to make this extension; to effect which, the mail travels to Chester at the rate of about nine miles an hour.

What time does the Chester mail arrive with Irish letters at Manchester?—It is now due there at half past nine A.M. but I have not been able to accomplish a regular arrival this season, chiefly on account of the obstructions at the two ferries in Wales; if that arrival be not effected, it is impossible to dispatch the letters from the Manchester post office to the Leeds and York road, as the mail to York cannot be detained one minute after ten o'clock, but the letters to Sheffield are invariably dispatched, the difference being merely a somewhat later arrival at that town. The effect of these late alterations has been to accelerate the communication between Sheffield and Ireland, and between the clothing district of Yorkshire and Ireland, twenty-four hours each way.

Would it not therefore be very desirable if arrangements could be made by which the Chester mail could arrive at Manchester somewhat earlier than it now does?—Undoubtedly; it would be of great advantage.

The improvement therefore of the Chester and Holyhead road, by giving you an opportunity of bringing the mail earlier to Manchester, would be of great convenience to that town and all the correspondence to the eastward of it?—It would be of advantage to that town in enabling the postmaster to make an earlier delivery, and it would secure a transmission of the letters to the York road.

At what time does the Chester mail leave Holyhead for Chester?—The present orders are to dispatch at half past three if the packet should have arrived and the agent be enabled to deliver the bags; whenever it is not in the agent's power to deliver them so soon, and he can deliver them by four, the mail coach waits till that hour; if they cannot be delivered by four o'clock, there is an unavoidable detention till the next day.

Does that detention frequently occur?—I do not know how often it has occurred, but I fear not unfrequently in the stormy weather of this winter.

At what time does the London mail leave Holyhead?—At six P.M.

Are mails frequently left behind in consequence of the coach leaving Holyhead before the packet arrives?—Very rarely indeed; since the establishment of the steam packets I doubt whether there have been above two or three instances.

Then if the Chester mail coach could be kept at Holyhead till six o'clock in the evening, of course the correspondence by Chester would be as regular as it is now to London?—Undoubtedly.

Might not this object be obtained by the improvement already calculated upon in the roads?—There would then be no difficulty except that of finding contractors willing to work at the rate of speed required of them, a difficulty which I should hope to be able to overcome.

This rate of speed is not uncommon now in various parts of the kingdom?—Not at all.

At what rate does the Edinburgh mail travel?—The mail travels the whole way from London to Edinburgh at the rate of eight miles and a half per hour, exclusive of stops for refreshment.

Are not many parts of the Chester road particularly steep?—It is certainly a very hilly road, and I consider the stage from Conway town to Aber one of the most difficult we have to perform in Great Britain.

Are not other parts of the road for short distances particularly steep?—The whole of it is a mountainous and difficult road.

Is it not very narrow in some parts?—In some parts it is very narrow.

Have accidents happened to the mail upon this road?—There have certainly been accidents at various times, some very serious; and after allowing for the carelessness or mismanagement of drivers, I think some of those misfortunes may be fairly attributed to the road.

At what time does the Leeds and York mail arrive at Manchester?—At half past ten A.M.

At what time does the Sheffield mail arrive at Manchester?—At one P.M.

Jovis, 21^o die Martij, 1822.

George Hay Dawkins Pennant, Esq. a Member of the Committee; Examined.

*G. H. D. Pennant,
Esq.*

(21 March.)

HAVE not you lately proposed to improve the road from Tal-y-bont Bridge towards Aber, by making a new piece of road so as to avoid the high hill at Tal-y-bont?—I did so in the autumn of last year, on condition that the private road from Aber Ogwyn to Port Penryn might be stopped up.

What was the result of this offer?—The result was, that the gentlemen interested said that they did not consider the improvement of the public road as an equivalent for stopping up the private road.

What is the extent of the new road that you proposed to make?—I conceive somewhere about three quarters of a mile, to entirely do away with the hill.

Have you not made some new arrangement in consequence of the rejection of this plan?—Yes, in consequence of the rejection of that plan, I offered to build a bridge over the Ogwyn, to make an archway under the approach to my bath, and to make a sufficiently good road for carts and horses along the sea shore between Aber Ogwyn and Port Penryn, to which the magistrates have consented.

Are you still willing to make the road to avoid Tal-y-bont Hill, in lieu of that road by the Bath?—Yes; provided the gentlemen of the country will accept that instead of the other; I have not gone so far but that I would willingly make the alteration.

Is the rise of that hill very great?—Yes; and the road is very narrow.

APPENDIX.

(1.)—(Post Office.)—RETURN of the number of Days the Packet from Howth has arrived too late at Holyhead for the departure of the Chester Mail Coach between 1st January 1821 and 1st January 1822.

THE Chester Mail Coach left Holyhead 147 days without the Irish Mail.

Mem.—The Steam Packets came upon duty the 31st May 1822.

Holyhead,
21st February 1822. }

Norris M. Goddard,
Agent.

(2.)—RETURN showing the Hours at which the Mail Coaches depart from Chester, Liverpool, Manchester, Sheffield, Leeds and York for Holyhead.

Departs

From Chester	-	-	-	-	-	-	at 6. 15. P.M.
— Liverpool	-	-	-	-	-	-	at 3. 30. P.M.
— Manchester	-	-	-	-	-	-	at 1. 30. P.M.
— Sheffield	-	-	-	-	-	-	at 6. A.M.
— Leeds	-	-	-	-	-	-	at 3. 15. A.M.
— York	-	-	-	-	-	-	at 12. Midnight.

Chas Johnson,
Surveyor and Superintendent.

(3.)—RETURN showing the Hours of Departure and Arrival of the Mail Coaches that carry Dublin Letters by Holyhead, at Chester, Liverpool, Manchester, Leeds, Sheffield, York, Glasgow, Edinburgh and Holyhead.

Departs from Holyhead	-	-	-	-	-	at 3. 30. to 4. P.M.
Arrives at Chester	-	-	-	-	-	at 4. 45. A.M.
Departs for Liverpool and for Manchester	-	-	-	-	-	at 5. A.M.
Arrives at Liverpool	-	-	-	-	-	at 8. A.M.
— at Manchester	-	-	-	-	-	at 9. 30. A.M.
Departs for Leeds and York	-	-	-	-	-	at 10. A.M.
— Sheffield	-	-	-	-	-	at 10. A.M.
Arrives at Leeds	-	-	-	-	-	at 4. 30. P.M.
— at York	-	-	-	-	-	at 7. 30. P.M.
— at Sheffield	-	-	-	-	-	at 4. 45. P.M.
Arrives at Holyhead from Chester	-	-	-	-	-	at 7. A.M.

which brings letters from all the places named above.

Note.—Letters from Dublin to Edinburgh and to Glasgow are not sent by Holyhead, but by Portpatrick. The arrival at Glasgow is in time for the morning delivery, but at Edinburgh the arrival is now 5 P. M. It will speedily be in the morning of the same day

Chas Johnson,
Surveyor and Superintendent.

ROAD FUNDS.

(4.)—ANSWERS by Mr. Henry Potts relative to the Chester and Northop Road.

Sir,

Chester, 23d February 1822.

ENCLOSED I transmit you the Answers required by an order of the Select Committee of the House of Commons on the Holyhead Road.

And am, Sir, your very obedient humble Servant,

Henry Potts.

Sir Henry Parnell, Bart.

Turnpike Road from Chester to Northop.

Answers required by the Select Committee of the House of Commons on the Holyhead Road.

1st.—Eleven and a half miles, all mail coach road.

2d.—The current year £. 1,340.

3d.—Debt on mortgage of the tolls	-	-	-	-	-	-	-	-	-	£. 3,450.
Viz.—Mrs. Cummins	-	-	-	-	-	-	-	-	-	£. 100
Miss Maddock	-	-	-	-	-	-	-	-	-	100
Mrs. Bold	-	-	-	-	-	-	-	-	-	300
Trustees of Chester Blue School	-	-	-	-	-	-	-	-	-	1,000
Mrs. Ball	-	-	-	-	-	-	-	-	-	100
Mr. Samuel Johnson	-	-	-	-	-	-	-	-	-	100
Mrs. Spence	-	-	-	-	-	-	-	-	-	50
Mrs. Poole	-	-	-	-	-	-	-	-	-	300
Mr. George Irlam	-	-	-	-	-	-	-	-	-	200
Vicar of Tarvin	-	-	-	-	-	-	-	-	-	200
Mrs. Taylor	-	-	-	-	-	-	-	-	-	100
Mr. Thomas Whittle's representatives	-	-	-	-	-	-	-	-	-	100
Honourable and Reverend George Neville	-	-	-	-	-	-	-	-	-	500
Mr. Stephen Crewe	-	-	-	-	-	-	-	-	-	300
										<u>£. 3,450</u>

About £.60 is owing for work on the Road, which will be paid by the Treasurer in a few days.

	s.	d.	Toll taken.
4th.—For every horse drawing a coach or such like carriage, by the Act	-	6	- 6
For every horse drawing a waggon, &c. not laden with coal, having six inch wheels	-	6	- 5
An additional half toll is taken for narrow wheels.			
For every riding horse	-	2	- 1½
For every drove of cattle	-	per score 1 3	1 3
- Ditto - calves sheep or lambs	-	ditto 10	- 10
- Ditto - swine	-	ditto 1 3	1 3
For every one horse cart drawing coal	-	5	- 4½
For every horse drawing a waggon or cart laden with coal, having wheels of a less breadth than six inches	-	3½	- 3
The like with six inch wheels	-	3	- 2
For every horse laden with coal, grit, stone or lime, and not drawing	-	1	- 1

5th.—Henry Potts, Chester, clerk and treasurer	-	-	-	-	-	Salary. £. 40. per ann.
Loudon M'Adam, general surveyor	-	-	-	-	-	50.
His travelling expenses about	-	-	-	-	-	36.
James Maule, sub-surveyor	-	-	-	-	-	104.

Henry Potts.

Chester, 23d February 1822.

(5).—LETTER from Mr. Francis Jones, enclosing the Reply from the Trustees of the Holywell, Flint and Mostyn Turnpike Districts of Roads.

Sir,

Holywell, 2d March 1822.

I HAVE enclosed the statement required by your letter bearing date 13th ultimo, which was a little delayed, owing to it passing through the hands of Sir Edward Pryce Lloyd, bart.

You will observe that I have taken the liberty of adding the total of the annual rents in each of the districts, together with the number of miles in the branch roads, in case such should be wanting.

The toll bars on the branch roads in these districts are a great source of revenue, owing to the extensive coal and lead mines, as well as the manufactories in this county; a circumstance well known to the honourable Committee.

I have only stated the rents on the mail road (as matter of opinion) to the best of my knowledge, as the whole of the gates in each district are let together, with the exception of one in the Flint district that rents at £. 41 per annum.

I have the honour to be, Sir,

Your most obedient and humble servant,

Francis Jones,

To Sir Henry Parnell, Bart. M. P.
&c. &c. &c.

Clerk and Treasurer to the Holywell, Flint and Mostyn Turnpike Districts of Roads.

REPLY from the Trustees of the Holywell, Flint and Mostyn Turnpike Districts, to Sir Henry Parnell, bart. M. P. Chairman to the Select Committee of the Honourable House of Commons, bearing date the 13th day of February 1822.

The extent of the Chester and Holyhead Mail Road under the care of the Trustees of the Holywell, Flint and Mostyn Trust :

	Miles.	Yards.
From Northop to Holywell, in the county of Flint	6	1,474 in Holywell District.
From Holywell to the Finger-post at Caerwys D ^o	4	1,430 in Flint District.
From the Finger-post at Caerwys, in the parish of Caerwys, down the valley, to the foot of Rhualt Hill to Pantevan, in the parish of Dymerchion, in the county of Flint	3	286 in Mostyn District.
	14	1,430 - - Total Mail Road.

	Miles.	Yards.
The extent of the Branch Roads in Holywell District	10	1,540
D ^o - - - Flint - - D ^o - - -	10	605
D ^o - - - Mostyn - D ^o - - -	41	1,408
	63	33 - - Total Branch Roads.

The Annual Tolls collected on the Mail Road:

Collected in the Holywell District	£. 485
D ^o - - - Flint - - D ^o - - -	300
D ^o - - - Mostyn - D ^o - - -	182
	£. 967 - - Total per annum

The Amount of Debts due by the Trust on Mortgage :

	£.		£.
The representatives of T. & P. Mostyn	615	The representatives of T. & P. Mostyn	900
Poor of the parish of Halkin	- 18	Sir Thomas Mostyn, bart.	- 900
David Pennant, esq.	- 250	David Pennant, esq.	- 354
Total in Holywell District	- £. 883	Mrs. Puleston's executors	- 313
		Mrs. Preston's - - d°	- 600
The representatives of T. & P. Mostyn	1,000	R. W. Wynne's - - d°	- 200
Earl of Shrewsbury	- 400	Thomas Williams, esq.	- 100
Executors of the late Edw. Jones, esq.	- 100	Honourable Miss Talbot	- 100
Bache Thornhill, esq.	- 100	Rev. Edward Wright	- 100
Holywell School	- 160	Poor of the parish of Nerquis	- 80
Poor of the parish of Halkin	- 40	Poor of parish of Henllan	- 50
Honourable Thomas Talbot	- 200	Total in Mostyn District	- £. 3,697
Rev. Edward Smedley	- 50		
Miss Jane Panton	- 150		
David Pennant, esq.	- 50		
Paris Mine Company	- 1,000		
Paul Panton, esq.	- 200		
Sir Thomas Mostyn, bart.	- 50		
Total in Flint District	- £. 3,500		

The records for each of the Districts were never handed to the Treasurer, nor can they be found ; but as the mortgages contracted in the time of the Treasurer for the time being are secured upon the whole extent of the Mail Road and Branch Roads, it is presumed that all former ones are of the like nature.

The RENTS of the whole of the Gates :

Holywell District	- - - - -	£. 730 per annum.
Flint - - D°	- - - - -	881 —
Mostyn - D°	- - - - -	735 —
		£. 2,346 - - Total Rents.

RATES of TOLLS collected on the Mail Coach Road :

- For all wheel carriages (not being cart or waggon) allowed by law sixpence each horse ; charged the same :
- For every draught horse drawing waggon or cart, the wheels being full six inches in breadth, allowed by law sixpence each horse ; charged four pence :
- For every draught horse drawing waggon or cart, the wheels being less than six inches in breadth, allowed by law eight pence each horse ; charged sixpence :
- For every saddle horse, mule or ass, allowed by law one penny halfpenny ; charged one penny :
- For every drove of oxen, cows or neat cattle, allowed by law not exceeding twenty pence perscore ; charged ten pence :
- For every drove of calves, hogs, sheep or lambs, allowed by law not exceeding ten pence perscore ; charged five pence.

In all cases double tolls on Sundays.

SALARIES.

HOLYWELL DISTRICT :

	Per Annum.
£. s. d.	
Francis Jones, treasurer and clerk	20 - -
John M ^c Adam, in surveillance, to be allowed his travelling expenses, which are yet unknown, as he only commenced on the 29th January last	—
John Leigh, sub-surveyor under the directions of John M ^c Adam	54 12 -

FLINT DISTRICT :

Per Annum.

Francis Jones, treasurer and clerk - - - - -	20 - -
John M ^c Adam, in surveillance, to be allowed his travelling expenses, which are } yet unknown, as he only commenced on the 29th January last - - }	- -
John Leigh, sub-surveyor under the directions of John M ^c Adam - -	54 12 -

MOSTYN DISTRICT :

Francis Jones, treasurer and clerk - - - - -	20 - -
John Leigh, sub-surveyor under John M ^c Adam, but not allowed any salary } for the short line of mail road in this district - - }	- -
William Jones, sub-surveyor under the Trustees for the Branch Roads -	39 - -

Holywell, }
February 25th 1822. }

Francis Jones,
Treasurer of the Holywell, Flint and Mostyn
Turnpike Districts.

(6.)—ANSWERS relative to St. Asaph District.

Query 1.—That there be laid before this Committee an account showing the extent of the Chester and Holyhead mail coach road under the care of the Trustees of the St. Asaph Trust.

Answer 1.—Extent of road in the St. Asaph district, from Pantevan Brook to Abergele, nine miles.

2.—What is the annual produce of the tolls collected on the road?

The annual produce of the tolls amounts to £. 226.

3.—What is the amount of debts, due by the Trust and the names of the persons to whom they are due; distinguishing the debts for which the tolls are mortgaged from other debts, and also distinguishing what debts are secured on the tolls collected on the mail coach road, from those which are secured on other roads?

	N ^o of Years Interest due.	Amount of Money advanced.	Amount of Interest due January 30, 1822.
		£. s. d.	£. s. d.
The Dean and Chapter of St. Asaph - -	-	474 - -	- - -
Executors of the late William Shipley, esq. -	5	200 - -	50 - -
Representatives of the late Col. W. Shipley -	3	200 - -	30 - -
Mrs. Margaret King - - - - -	1	300 - -	15 - -
Mrs. Margaret King - - - - -	-	100 - -	- - -
Mrs. Margaret King - - - - -	-	100 - -	- - -
The Vicars of St. Asaph, in trust for the Poor -	6	100 - -	30 - -
Representatives of the late Peter Whitley, clerk -	2	150 - -	15 - -
Trustees of the North Maoles School - -	12	130 - -	78 - -
Abergele School - - - - -	-	29 - -	- - -
Representatives of the late Mrs. Susanna Lloyd -	3	54 - -	8 2 -
		1,837 - -	226 2 -

These several debts are secured by mortgage on the mail coach road, there being no other road.

4.—What are the rates of tolls which are allowed by law to be collected on the mail coach road, and the rates actually collected?

By law, sixpence on each horse in draft; actually taken, four pence on each horse in draft.—Double Tolls on Sundays.

5.—What are the names of the treasurer, clerk and surveyor; and what salaries or other perquisites are received by each of them?

Hugh Stodart, treasurer and clerk, appointed November 30, 1789, with a salary of six guineas per annum, advanced in 1820 to £. 15. per annum. William Jones, as surveyor, with a salary of £. 1. 11 s. 6 d. with 2 s. 6 d. a day when actually employed as a workman.—No perquisites of any sort are received by either the clerk, treasurer or surveyor.

(7).—ANSWERS relative to Conway District.

Query 1.—What is the extent of the Chester and Holyhead mail coach road, under the care of the Trustees of the Conway Trust?

Answer.—From Abergele to Conway Ferry House, eleven miles.

2.—What is the annual produce of the tolls collected on the road?

The annual produce of the tolls amounts to £. 191:

3.—What is the amount of debts due by the Trust, and the names of the persons to whom they are due; distinguishing the debts for which the tolls are mortgaged from other debts, and also distinguishing what debts are secured on the tolls collected on the mail coach road, from those which are secured on other roads.

	N ^o of Years Interest due.	Amount of Money advanced.	Amount of Interest due 30th January 1822.
		£. s. d.	£. s. d.
Rev. George Moore - - - -	1	625 - -	31 5 -
Representatives of the late Thomas Williams, esq. - - - -	2	1,570 - -	157 - -
The poor of Llysfaen parish - - -	- -	45 - -	- -
	- -	2,240 - -	188 5 -

These several debts are secured by mortgage on the mail coach road, there being no other road.

4.—What are the rates of tolls allowed by law to be collected on the mail coach road, and the rates which are actually collected?

By law, sixpence on each horse in draft; actually taken, four pence each horse in draft. Double tolls on Sundays.

5.—What are the names of the treasurer, clerk and surveyor, and what salaries or other perquisites are received by each of them?

Hugh Stodart, treasurer and clerk, appointed on November 30th 1789, with a salary of six guineas per annum, but advanced in 1820 to £. 10 per annum.

William Jones, as surveyor, with a salary of £. 1. 11s. 6d. and 2s. 6d. a day when actually employed as a workman. No perquisites of any sort are received by either clerk, treasurer or surveyor.

Hugh Stodart,
Treasurer and Clerk.

(8).—LETTER from Mr. Roberts, enclosing Answers relative to Conway, Road.

Sir, Glanydwr, Carnarvon, 20th February 1822.

I AM sorry that I was not able to send the enclosed sooner, which I hope will answer the queries.

There are other branches of Roads inserted in the Act of the 50 Geo. III. Session 1810, of which that from Glanrhyd on the Pwllheli Road to Trunador has been made by the Subscriber to the same at the time of procuring the Act and mortgaged, but I do not know the amount as I have had no concern with the same.

I am Sir,

Your most obedient Servant,

Sir Henry Parnell, Bart.

Rob. Roberts.

Answer 1.—Thirteen miles from Llandegai to Conway is travelled by the mail coach under the Carnarvonshire old trust.

2.—Gates set on the same Road in January 1822, the Bangor gate included, } £. 523.
amount to

Average of the same for the last ten years - - - - - £. 480. 18s.

3.—Debts due by mortgage of all the tolls under the 9 Geo. 3, c. 77, and 17 Geo. 3, c. 110, with the names of the creditors:

The Poor of the Parish of Llannor	-	-	-	-	-	-	£. 100
The Executors of Miss Vincent	-	-	-	-	-	-	400
The Dean and Chapter of Bangor	-	-	-	-	-	-	320
The Poor of the Parish of Aber	-	-	-	-	-	-	100
Mr. Edward Banton	-	-	-	-	-	-	100
The Poor of the Parish of Llanbeblig	-	-	-	-	-	-	20
The Poor of the Parish of Rhoscolyn	-	-	-	-	-	-	90
The Poor of Llandegwning, Llanestyn, Llangian, &c.	-	-	-	-	-	-	100
Mrs. Sarah Owen	-	-	-	-	-	-	100
The Rector and Churchwardens of Llanllechid	-	-	-	-	-	-	100
The Bishop Rowland's Charity	-	-	-	-	-	-	125
The Rev. Henry Jones	-	-	-	-	-	-	200
James Greenfield, esq.	-	-	-	-	-	-	100

£. 1,855

Sum advanced under the Act of 50 Geo. 3, Session 1810, by the } 50

Right honourable Viscount Warren Bulkeley - - - - -

£. 1,905

There is about £.80 interest due on the above mortgages.

4.—Tolls allowed by law to be taken at the turnpike gates, in the column N° 1, and the rates taken, in N° 2 :

	N° 1.	N° 2.
For every horse, mare, gelding, &c. not drawing	1½d.	1d.
For every horse, &c. drawing waggons, wains, carts, &c. with the owner's name and place of abode painted in legible letters of two inches or upwards	8d.	3d.
For every horse, &c. drawing waggons, &c. on which the owner's name and place of abode are not painted in legible letters two inches long	12d.	6d.
For every horse, &c. drawing any coach, chaise, &c.	8d.	6d.
For every score of oxen or neat cattle	12d.	10d.
For every score of calves, swine, goats, sheep or lambs	6d.	5d.
Double tolls paid on Sundays.		

5.—Mr. Edward Griffith Roberts is surveyor of the road from Llandega; being 25 miles ; salary £.30 per annum ; no perquisites.

Robert Roberts is surveyor from Bangor to Pwllheli, and from Carnarvon to Pwllheli, being 42 miles ; is also clerk and treasurer to the Trustees ; salary £.30 ; no perquisites.

Carnarvon, }
20th February 1822.

Rob. Roberts

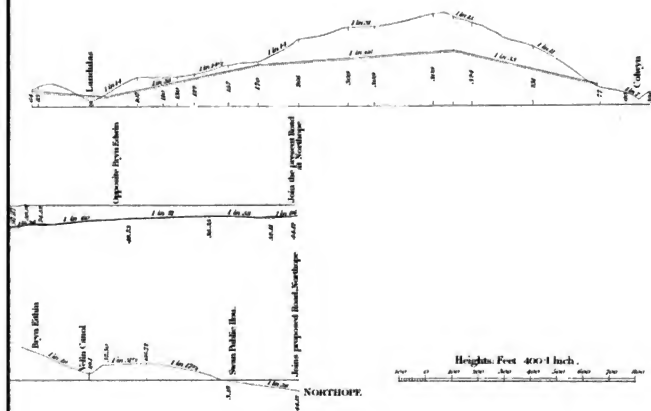
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100

100

SECTIONS ON THE ROAD BETWEEN BANGOR AND CHESTER.

379.
Penmaen Rhos



A. Freeman Smith, Surveyor.
Litho. Howard and Sons, Printers.

100

100

100

100

FOURTH

R E P O R T

OF THE

SELECT COMMITTEE

ON THE

ROADS

FROM LONDON TO HOLYHEAD,

&c.

ROAD THROUGH ENGLAND,
FROM NORTH WALES TO LONDON.

Ordered, by The House of Commons, to be Printed,
17 May 1822.

THE REPORT - - - - - p. 57

MINUTES OF EVIDENCE - - - - - p. 67

APPENDIX :—viz.

N° 1.—Mr. Telford's Third Report by order of the Lords of the }
Treasury - - - - - } p. 76

N° 2.—Mr. Telford's Report upon the state of the Road from }
Shrewsbury by Coventry to London - - - - - } p. 77

Plate I.—Map of the present and proposed Mail Roads between Moxley
and Meriden on the Coventry Road.

Plate II.—Maps of the present and proposed Mail Road from Chirk to
near Shiffnal.

FOURTH REPORT.

THE SELECT COMMITTEE appointed to inquire into the state of the Roads from *London to Holyhead*, and from *Chester to Holyhead*; into the regulations for conveying His Majesty's Mail between *London and Dublin*, and between the Northern Parts of *England and Dublin*, and between *Dublin and the interior of Ireland*; and into the state of the Mail Coach Roads in *Ireland*; and to report their Observations thereupon, together with the MINUTES of the EVIDENCE taken before them, from time to time, to the House;—HAVE, pursuant to the Order of the House, further inquired into the Matters to them referred, and have agreed to the following REPORT:

YOUR Committee, in their First and Third Reports, have described to the House the state of the Roads from Holyhead to Chirk, at the boundaries of North Wales, on the Shrewsbury line; and from Holyhead to Chester; in this Report they lay before the House a statement of the condition of the Road from Chirk, by Birmingham and Coventry, to London; showing what Improvements have been completed, what are in hand, and what still remain to be undertaken, in order to render the whole of this Road as perfect as circumstances will admit of.

In consequence of the recommendation of the Holyhead Road Committee of 1817, the Lords of His Majesty's Treasury issued an order directing Mr. Telford to survey this Road, and report his opinion upon all variations and improvements that should appear to him to be practicable for making it shorter and more convenient for travelling. In pursuance of this order, Mr. Telford gave in one Report on the 30th of June 1819, a second on the 1st of June 1820, and he has lately made a third Report, dated 1st of May 1822.

The two first Reports were laid before the House, and printed in the Session of 1820, and contain Plates showing the several variations proposed by Mr. Telford between Chirk and London. The third Report is inserted in the Appendix to this Report, with Plates showing two very important variations by which the Road may be shortened nine miles.

Immediately after Mr. Telford made his second Report in 1820, which contains the Plans and Estimates of his proposed variations, the Parliamentary Commissioners acting under the 55 Geo. III. c. 152, for the improvement of the Road from Holyhead to London, obtained an Act of Parliament, (1 Geo. IV. c. 70,) to aid in carrying those variations into execution.

This Act provides, that if the Trustees of any part of the Road shall be willing to borrow Exchequer Bills from the Commissioners of Public Works, for executing any particular improvement, and to vest them in the hands of the Parliamentary Commissioners, the Parliamentary Commissioners shall make a contract for the intended improvement, and manage the business of executing the works; but upon the condition

that the consent of a Committee of the Trustees shall be certified on the deed of contract before the contract shall be executed by the Commissioners. By these provisions the Trustees have an opportunity of securing the benefit of the superintendence of the Parliamentary Commissioners over the proper application of their money; and the advantage of Mr. Telford's system of executing large works by his superior method of arranging the terms of contracts, and securing the faithful performance of them; at the same time, that by possessing the power of giving or withholding their consent to the contracts, the Trustees enjoy a full control over the Parliamentary Commissioners as to the improvement to be made, and the expense to be incurred upon it.

The Parliamentary Commissioners lost no time in endeavouring to give effect to the new Act, and to Mr. Telford's Report. They appointed Sir Thomas Mostyn and Sir Henry Parnell as a deputation of their Board to confer with the several Trustees, and directed Mr. Telford, their engineer, and Mr. Milne, their secretary, to accompany them.

These Commissioners attended meetings of ten of the Trusts, and succeeded in making arrangements with them for the most important of the variations proposed by Mr. Telford. But the local Acts of these Trusts (except in the case of the Stratford and Dunchurch Trust) did not admit of their borrowing money from the Exchequer Bill Commissioners upon the terms prescribed by their Act; and it therefore became necessary for the Parliamentary Commissioners to obtain a new Act of Parliament in the Session of 1821, to give effect to the arrangements that had been made between them and the Trustees.

By this new Act, (the 1 & 2 Geo. IV. c. 30,) the Exchequer Bill Commissioners are required to pay to the Parliamentary Commissioners the sum of £1,000*l.* and the Parliamentary Commissioners are required to apply the same to the works described in the Schedule of the Act, according to the provisions of the preceding Act of 1 Geo. IV. c. 70. Each Trust is enabled to raise additional tolls to pay, on its share of this sum, interest at the rate of 5 per cent, and a Sinking Fund at the rate of $2\frac{1}{2}$ per cent, per annum. The following Account, extracted from the Schedule of the Act, shows how the sum of £1,000*l.* was allotted.

	£.
Hockliffe and Stratford Trust - - - - -	7,000
Dunchurch and Stonebridge ditto - - - - -	5,500
Stonebridge and Birmingham ditto - - - - -	4,000
Bilston ditto - - - - -	8,000
Wolverhampton ditto - - - - -	2,500
Shiffnal ditto - - - - -	2,000
Wellington ditto - - - - -	2,000
	£. 31,000

This sum was paid by the Exchequer Bill Commissioners to the Parliamentary Commissioners in the month of June 1821.

The Trustees of the Stratford and Dunchurch Road had been able to borrow, under their own Act, the sum of 8,000*l.* from the Exchequer Bill Commissioners; this sum they vested in the hands of the Parliamentary Commissioners, to be expended under the provisions of the 1 Geo. IV. c. 70; so that the whole sum which has been received by

by the Parliamentary Commissioners under the two Acts has been 39,000*l*.

In the course of the months of June and July 1821, the Parliamentary Commissioners made contracts, pursuant to the 1 Geo. IV. c. 70, for the improvements at Braunston Hill, Cuttle Mill Hill, Little Brickhill and Hockliffe; and the works were commenced the beginning of August.

The new Road at Cuttle Mill has been opened to the Public since last March; that at Brickhill is now ready to be opened; a considerable part of the new Road at Fourne Hill, is in use; and the progress made at these hills, near Hockliffe, and at Braunston is such, as to secure the completion of all these improvements by Michaelmas. All the work has been executed upon the same perfect principles as have been acted upon in North Wales by Mr. Telford; and the terms of the contracts as to prices, having been in the first instance justly calculated, so as to give the contractors such returns as skilful and industrious men ought to have for their labour and time, there will be no exceeding of the sums stipulated for by them for executing these works; at the same time, though they have had a most unfavourable winter to contend with, and great difficulties to encounter in obtaining materials, there will be no cause for them to complain of their bargains.

The Parliamentary Commissioners were prevented by the Trustees concerned in the other improvements, from being able to make contracts for them before last March. In that month they concluded the business of completing contracts, pursuant to the provisions of 1 Geo. IV. c. 70, for the improvements at Ketley, Prior's Lee, Cosford Brook, Summerhouse Hill, and Meriden Hill. Considerable progress has already been made by the contractors at Cosford Brook and Meriden Hill.

On referring to the statement of the works to be executed with the sum of 31,000*l*. it will appear that no progress has been made with the proposed improvements connected with the Stonebridge and Birmingham Trust and the Bilston Trust. These improvements relate to a new piece of Road from Small Heath Toll-bar to the bottom of Bordsley-street, in the town of Birmingham; and a new Road of three miles in length across the collieries south of Wednesbury, from West Bromwich, to near Bilston. The first estimated at 4,000*l*. the second at 8,000*l*.

The Parliamentary Commissioners have postponed proceeding with these improvements in consequence of the numerous defects which would remain on this line of Road, after expending so much money upon it, and also in consequence of having ascertained that a perfect line of road, two miles shorter than the present Road, may be made from the Canal Bridge at Moxley, west of Wednesbury, to Stonebridge, two miles west of Meriden. Mr. Telford describes, in his third Report, very minutely the defects of the present Road, and the superior character of the proposed new Road. The distance saved is two miles; at the same time, that the hills at Bromwich, Soho, Birmingham and Small Heath are all avoided.

Appendix, p. 76;
and Plate I.

Your Committee have to remark, that it may be objected to this new line that it passes to the North of Birmingham, and consequently that the town of Birmingham may lose some of the advantages it now has from the Irish travelling. But as to this plea in favour of local interests,

Your Committee conceive the point to have been already decided by former Committees, and by the proceedings of Parliament, so far as the communication between England and Ireland is in question. In the case of the new Road across the Island of Anglesey, by which the interests of some towns, said to be of great importance, and the whole property vested in a large Inn were altogether destroyed, Parliament passed an Act for making this Road, though a petition against it was sent up from a County meeting, in order to protect the local interests connected with the old Road. The right of individuals in the ferries of Bangor and Conway, have on the same principle been taken away by Parliament: all these things have been done, and with good reason, and proper consideration for the public interest; for if this principle was not to guide the Legislature, and the principle of attending to local interests was to predominate, the inhabitants of Northampton and of Warwick, or of Dudley and of Walsall, would have just as good a right to require the Holyhead Road to be brought through these towns, as the inhabitants of Birmingham or of Shrewsbury have of requiring it to be continued where it now is, sooner than suffer the Public to have a shorter Road by nine miles than the present Road. The principle which requires the public interests to be accommodated to the local interests, rests upon a very perverted notion of the legitimate object of a good Road; those who advocate this principle must believe, that the right use of a Road is to enable Landlords to obtain high rents for their Inns, and their Tenants to make large profits from Travellers; whereas, the only true and proper object of a good Road should be, to enable Travellers to pass, in the shortest possible time, between any two places or points; and with the least possible trouble and expense. Your Committee cannot imagine any thing more unjust and unreasonable than to make the long journey from Holyhead to London, still longer by ten or fifteen miles than it ought to be, in order to give to certain towns the profits to be made by the expense which this extra distance imposes in every year on ten or fifteen thousand Irish Travellers, who are obliged from business or the performance of some public duty, to perform this journey.

Your Committee learn from Mr. Telford's third Report, that after the works now under contract are completed, many more improvements will remain to be made.

- 1st. The improvement from the Toll-gate at Prior's Lee to the top of Knowles's Bank.
- 2d. The improvement of the Hill east of the Summer-house.
- 3d. The improvement from the village of Allesley to Witley Hall.
- 4th. The improvement between Weedon and Towcester.
- 5th. The western approach to St. Alban's.
- 6th. The improvement between South Mims and Barnet.
- 7th. The improvement of Barnet Hill, and the Hill north of Whetstone.

Your Committee particularly recommend these improvements to the consideration of the several Turnpike Trusts who are concerned in them. There seems to be no difficulty in the way of their obtaining the necessary funds from the Exchequer Bill Commissioners, if they think proper to co-operate with the Parliamentary Commissioners after the example of the other Trusts, in respect to the manner of applying their funds. Another Act may readily be procured in the next Session for securing the money that may be wanting; and after the experience which the Trustees have had of the efficacy and success of the system which is pursued by the Parliamentary Commissioners, they may look forward

forward with certainty to the expenditure of the money in the most economical and satisfactory manner.

Besides the improvements which have been mentioned as going on under the management of the Parliamentary Commissioners, Your Committee are informed that some of the Trusts had undertaken several very important variations under their own superintendence, previous to the passing of the Act 1 Geo. IV. c. 70.

The St. Alban's Trust in 1818 borrowed from the Exchequer Bill Commissioners a sum of 6,000 *l.* and made a new Road over Ridge Hill. This Road is a great improvement, and does great credit to the Trustees. It would, by this time, have been in excellent order, had Mr. James M'Adam, the Surveyor of the Trust, followed his own rules in selecting proper materials; nothing but broken flint or pebbles ought to be put on this Road; according to Mr. Telford's Reports, a considerable quantity of them is wanting to give the Road a proper degree of strength.

The Bilston Trust in 1819 borrowed a sum of 3,000 *l.* from the Exchequer Bill Commissioners, and made a new piece of Road, by which the street of Bilston is avoided, and the Road shortened a quarter of a mile; this Road was made on a plan furnished by Mr. Telford, with a regular foundation, and of a proper form. The Trustees do not appear, according to Mr. Telford's Report, to take proper care of this new Road.

The Commissioners of the town of Wolverhampton have nearly completed a new piece of Road from the Market-place, in a direct line, till it meets the present Road. This will be a very useful improvement, and is very creditable to the Commissioners.

The Wolverhampton Trust in 1819 borrowed from the Exchequer Bill Commissioners 6,000 *l.* and have made considerable progress in a very great work, by which the present dangerous Road up Tettenhall Hill will be avoided.

The Trustees offered to place the management of this improvement in the hands of the Parliamentary Commissioners, but they declined to undertake it, in consequence of the Trustees refusing to adopt Mr. Telford's plan of making a short tunnel in place of cutting forty feet through the hill. It is now quite evident, that had Mr. Telford's plan been acceded to, the work would have been executed at a less expense, in a much shorter time, and in a way to make the inclination of the hill more easy than it now will be; on the whole, however, the Public will have reason to be greatly indebted to the Trustees for getting rid of perhaps the most dangerous and inconvenient hill upon the whole Road.

The Wellington Trust have widened and improved a considerable length of this Road, under the able direction of Mr. M'Adam, with their ordinary road funds; and the Shrewsbury Trust have lowered the hill at Emstree, near Shrewsbury.

Your Committee, upon referring to the Reports of the Holyhead Road Committees of 1817 and 1819, are fully sensible how valuable the recommendations of those Committees have proved to the Public, supported as they have been by the persevering exertions of the Parliamentary Commissioners and the Legislature. Since 1817 a sum of 54,000 *l.* of Exchequer Bills has been borrowed for the various improvements that have been described; the whole of which large sum

has been, or soon will be, applied in getting rid of the most inconvenient obstacles to safe and rapid travelling, in a judicious and effectual manner, without any waste or wrong application of any part of the funds. Should the advice of Your Committee be followed by the Trustees, of pursuing the same system in respect to obtaining new loans, till the remaining improvements proposed by Mr. Telford are all completed, this long line of Road from Chirk to London will not have a single hill upon it that may not be trotted over, even by a pair of horses in a loaded travelling carriage.

Your Committee have obtained from the Parliamentary Commissioners, a copy of Mr. Telford's last Report upon the state of it, as to ordinary repairs. They find that a general reformation has taken place from one end of the line to the other, in respect to the manner in which the surveyors execute their duty. It appears from the Report of the Committee of 1819, that the Trusts between London and Shrewsbury receive in tolls 38,010*l.* per annum, from which deducting 2,779*l.* as the interest on their debt, there remains 35,231*l.* for repairing one hundred and fifty-four miles of mail road, and sixty-two miles of branch roads. Considering how large a contribution this is, and the great importance of this Road to the public interest, those who are appointed by Parliament as Trustees to take care of the proper application of this fund, could not, with any just regard to that interest, be suffered to neglect their duty, by allowing the Road to continue for ever, as it had been, not only a bad road, but much the worst in England. From the great change which has taken place in the last twelve or eighteen months, it would appear that it was not from any indisposition on the part of the Trustees or the Surveyors to fulfil their duty, that this Road remained in so shocking a state; but from not knowing how to select and manage the materials, and to give the Road a proper form. This was so evidently the case, that the Parliamentary Commissioners found it absolutely necessary to direct Mr. Telford to appoint an experienced Engineer to reside constantly on the Road, to give instructions to the Surveyors; at the same time, the Commissioners printed certain rules, drawn up by Mr. Telford, for repairing roads: the consequences of these measures have been the entire reformation, already mentioned, of all the Surveyors. The use of the Road-level has contributed to bringing the Road to a proper form; this instrument should be constantly in the hands of the workmen, and never out of the mind of the Surveyor; for the road will never be perfect so long as a single spot of its surface shall not be according to the exact line which is pointed out for its transverse or cross section; on such a spot water will settle, and lead to large hollows or ruts. The reducing of the wide parts of the Roads to a breadth of thirty feet has been attended with great advantage; the proper line of transverse section can be, in this way, accurately preserved; and the business and expense of keeping the surface clean and in repair is much diminished. The Surveyors have every where abandoned "the ancient system of gravelling*," which they formerly followed. By taking proper pains, better materials have every where been obtained; these are, if composed of stone, broken to a proper size; and if of gravel, sorted, so that only the pebbles are used, after being broken, for the eighteen centre feet of the Road. The Surveyors, however, have still a great deal to do before they succeed in having their respective portions of the Road quite perfect, as to form, and so strong as to continue free from ruts. The following suggestions are particularly recommended to their attention:—

1st.—To

* See Evidence of Henry Norris, Report, 1819. p. 151.

1st.—To complete the business of lifting the Road, so as to gain the proper form, and get out of it all large stones.

2d.—To make the whole breadth of eighteen feet in the middle of the Road of sufficient strength, by digging out the earth, and putting on thick layers of broken stones; and also to strengthen the sides.

3d.—To drill the ruts with stones broken very small, as fast as they appear, never suffering a rut to get more than two inches deep without filling it.

4th.—To have all the heaps of road materials piled on the earth banks, that are outside the boundary line of the Road when formed to thirty feet in breadth, with proper side drains.

5th.—To keep the drains which are formed by the angle of the slope of the Road, and the side of the fence or footpath, which are called the side drains, at all times free from dirt; so that the water may pass along them without being forced over the surface of the Road.

6th.—To secure a sufficient stock of well prepared materials before the commencement of every winter; so that all ruts may be filled as fast as they appear.

7th.—To remove all banks of earth or road drift, all hedges and other fences, and all trees that in the smallest degree prevent the sun from shining on the Road, or obstruct the free circulation of the air.

Your Committee have inserted in the Appendix to this Report a circular letter, which was written, by the direction of the Parliamentary Commissioners, to the several Trusts, concerning the cutting of hedges and trees; and they are glad to find from Mr. Telford's Report that immediate and general attention was paid to it. They observe, however, that Mr. Telford states that the Road is in many places still very much injured with the trees that stand in the hedges. The parts of Road where they are most destructive are, 1st. On the Wolverhampton Trust: west of Cosford Brook; near the Horns; and at Wrottesley Park. 2d. On the Dunchurch and Stone Bridge Trust: on leaving Coventry for Dunchurch; and the whole way from Knightlow Hill to Dunchurch. 3d. In the Stratford and Dunchurch Trust: for one mile east of Dunchurch; two miles west of Daventry; along Nuneham-lane to Weedon; along a great part of the Road from Forster's Booth to Towcester; and at many places between Towcester and Stratford. 4th. On the Hockliffe and Stratford Trust: on both sides of Shenley. Of late several new plantations have been made on the south side of this Road, which in time will prove very destructive, and occasion a great waste of money and materials; Mr. Telford says in his Report, "The Trustees should be aware that trees add at least 25 per cent to the expense of keeping a Road in repair; and therefore, that out of every 100*l.* they spend in repairing a Road sheltered with trees, 25*l.* goes to repair the injury which is occasioned by the owners of trees not removing them, and should be set down to their account."

Appendix, p. 83.

Mr. Telford having stated in his Report that the Road under the care of the Birmingham and Wednesbury Trustees was in a very bad state, Your Committee ordered the Clerk, Mr. Crowther, to attend with the books of this Trust. They examined Mr. Crowther fully in respect to the funds of this Trust, and the general management of the Road. It appears that seven miles of the Mail Road and seven miles of Branch Roads are under this Trust, and that the income of it is 2,327*l.* 5*s.* from which is to be deducted about 13*l.* for the weighing-machine keeper at Cordley, and 145*l.* per annum for interest on the debt of the Trust, leaving a net income of 2,169*l.* 5*s.* per annum; as this sum will allow

Appendix, p. 79.

Appendix, p. 68. 70.

of expending 230*l.* per mile on the Mail Road, and 80*l.* per mile on the Branch Road, and as materials are abundant and excellent, the Trustees can plead no justification for having their Road in such bad condition. Your Committee have not been able to discover, from the examination of Mr. Crowther alone, or from the accounts which he produced, whether the fault lies with the Trustees in not providing their Surveyor with sufficient funds, or with the Surveyor in misapplying them. If the case be that the Surveyor has received sufficient money for maintaining the Road in good repair, then there can be no question about the expediency of remedying the evil, by immediately appointing another Surveyor in his place. Mr. Crowther attempted to account for the bad state of the Road from the number of heavy one-horse coal-carts that pass over it; but to this plea Your Committee attach no value, because the Trustees possess sufficient funds, and have an opportunity of getting any quantity of excellent materials to make a Road so strong that no coal-carriage could injure it. This Road was formerly in very good order, when the same heavy one-horse carts were constantly upon it.

Mr. Telford having also mentioned, in his Report, that the Street of Stoney Stratford was in a very dangerous state, Your Committee ordered Mr. Congreve, the Clerk of the Commissioners of Stoney Stratford, to attend them with the books of the Commissioners. They examined Mr. Congreve; whose evidence is given in the Appendix.

Appendix. p. 71.

It appears that certain estates were many years ago bequeathed to Trustees for the purpose of repairing the Streets of this Town. That in 1801 an Act of Parliament was obtained to enable the Commissioners therein named to sell these estates, and to apply two-fifths of the produce to the paving of the main street; the remaining three-fifths to accumulate till they amounted to the original sum.

These estates sold for 6,510*l.* 2*s.* It is said that 2,321*l.* 8*s.* 7*d.* was expended in paving 436 yards of the street of the breadth of 27 feet. It is also said that a sum of 572*l.* raised by subscription in 1811, was applied to this street; and another sum of 620*l.* in 1815; and that 60*l.* a year has been annually paid by the parish, making in all a sum of 4,653*l.* that has been by some means or other expended under the pretext of maintaining the public Road through the town of Stoney Stratford, and a small Bridge over the river Ouse. Your Committee are of opinion that it is impossible that this sum could have been duly applied in the way it ought to have been, because there are several of its members who have been in the habit of constantly passing through the town of Stoney Stratford, who all concur in opinion that they never at any period, during the last nineteen years, saw the street in any other state than full of such a succession of deep holes and ruts, occasioned by a mixture of very large and very small stones, most unskillfully put together, as threatened to rend asunder every part of their carriages. As the three-fifths of the original sum of 6,510*l.* have again amounted to this sum, and the Commissioners have now the interest of it to apply to the improvement of this short length of the Holyhead Road, it is to be hoped that they will place the management of it in proper hands, and lose no time in lifting and new setting the part already paved, and in procuring limestone of a proper quality for repairing that part which is not paved.

It appears from Mr. Congreve's evidence, that three years interest on the sum of 3,482*l.* vested by the Commissioners in Exchequer bills, has been lost in consequence of the neglect of their solicitors to apply for it:

Your

Your Committee are of opinion, that this interest ought to be paid by the Treasury.

Your Committee have also examined Mr. Stable, the managing Director of the Highgate Archway Company. This Road Mr. Telford describes as being very much out of order. The excuse pleaded by Mr. Stable is want of funds, and the great expense attending the procuring of good materials. But if the sum, which Mr. Stable says is expended annually, is skilfully and honestly applied, it is quite sufficient to make this an excellent Road. As Mr. Stable has informed the Committee, that large quantities of flints have been purchased by the Company, Your Committee look forward to an early improvement of this very useful variation from the old Highgate Road. Appendix, p. 74.

Mr. Telford, in his Third Report, made under the order of the Lords of the Treasury, mentions that he has surveyed a line of new Road, from Chirk Bridge to the Cock Inn, at Watling-street, by which the Hill east of the Bridge at Chirk may be avoided, and the Road to London shortened seven miles. This line he represents to be free from hills, and to pass through a district of country particularly favourable for road-making. See Appx. p. 76; and Plate II.

As this new line will leave out the town of Shrewsbury, the expediency of making it rests upon the same general grounds as those which have already been stated in the case of the new line from Stone bridge to Moxley.

Your Committee have drawn up the following Statement, to show the whole saving of distance that may be obtained between Chirk and London, by completing Mr. Telford's improvements.

SAVINGS OF DISTANCE.					Miles.	Yards.
1.	The new line from Chirk Bridge to the Cock, at Watling-street	-	-	-	7	184
2.	The improvements at Prior's Lee	-	-	-	—	550
3.	The new line of road from Moxley, west of Wednesbury, to Stonebridge	-	-	-	2	—
4.	The new line of Road south of Coventry	-	-	-	—	880
5.	The new line of Road into St. Alban's	-	-	-	—	220
6.	The new line of Road from South Mims to Barnet	-	-	-	—	600
					10	674

The distance from London to Holyhead has already been reduced from 264½ miles to 260, by making the new Road across the island of Anglesey, and other new Roads; and it appears, from the above statement, that it may be still further reduced 10 miles 674 yards, making the whole distance under 250 miles.

If that were to be effected, the following would be the results. In the first place, the journey between London and Holyhead might be performed in two days, at 125 miles each day, travelling post with a pair of horses, and without losing a night's rest. Secondly, the mail might perform the journey at 8½ miles an hour, in 29 hours and 20 minutes. This would bring it to Holyhead at 20 minutes past one o'clock in the morning: so that, with an average passage of seven hours and a half across the Channel; and allowing one hour for going from Howth to Dublin, the English letters would arrive in Dublin at ten o'clock on the second morning from London.

343.

But

But the most important result of thus making it practicable to convey the London letters in 38 hours to Dublin, will be the increased facility of transacting the public business. That belonging to Ireland, connected with the executive government, may be settled in London; and all matters relating to the Irish revenue, to which the Lords of the Treasury and the English Revenue Departments are or shall be made a party, may be as readily decided upon in London, and put into operation, as if they belonged to some English county.

Your Committee entertain a very strong expectation that this facility of communication between the two countries will, in the way now pointed out, contribute not only to a more early, direct and effectual administration of public business of every description in Ireland; but also, that it will lead to the simplifying and consolidating the method of transacting it in such a manner as eventually to be attended with a considerable saving to the Public on official establishments. Should this expectation of Your Committee prove to be well-founded, all the money that has been applied to the improvement of the Roads, Bridges and Harbours belonging to this communication, will then appear to be a source of retrenchment and gain to the Public. This way, however, of considering the subject has not been the usual one that has been taken by those persons who have superficially examined it; but let these persons recollect that so recently as in the year 1808, the Holyhead Mail Coach occupied 48 hours in its journey between London and Holyhead, and that the London letters were seldom delivered in Dublin before the fourth morning after their departure from London; and then they must allow, that, if in the end they will arrive in Dublin in 38 hours, the money expended in securing this object has been well applied. Those persons also, who may be adverse to so great an innovation as that of conducting the administration of Irish affairs in London, will allow that the state of the case as to the means of communication between the two countries is so entirely new, as to make many reformatations not only safe but essentially necessary, that before were quite unsafe and perhaps impracticable.

17 May 1822.

MINUTES OF EVIDENCE.

<i>Sir Henry Parnell, Bart. a Member of the Committee</i>	-	-	-	p. 67
<i>Mr. Stephen Falknor Crowther</i>	-	-	-	p. 68
<i>Mr. John Frere Congreve</i>	-	-	-	p. 71
<i>Mr. David Henry Stable</i>	-	-	-	p. 74

Luna, 13^o die Maij, 1822.

SIR NICHOLAS COLTHURST, BARONET.

IN THE CHAIR.

Sir Henry Parnell, Bart. a Member of the Committee.

ARE you one of the Commissioners under the 55 Geo. III. for the improvement of the Holyhead Roads?—Yes.

What steps have been taken by them for the improvement of the English part of this road?—The Committee of the Session of 1817, recommended a survey to be made of the whole of this line of road by Mr. Telford; and the Lords of the Treasury, in consequence, issued an order to him to make this survey; he made one Report upon the state of the road in the year 1819, and another in the year 1820; in the latter Report he gave plans for a great many variations and improvements. The Parliamentary Commissioners, in order to assist in carrying those improvements into effect, obtained an Act in 1820 to enable the trustees who had the care of this road, to place the funds they might raise for making improvements on their respective portions of it, in the hands of the Commissioners, so that they might be expended, subject to the superintendence of the Commissioners, under the immediate direction of Mr. Telford. After this Act passed, the Commissioners appointed Sir Thomas Mostyn, and myself, as a deputation to confer with the trustees, and make arrangements for carrying on the improvements; Mr. Telford and our secretary, Mr. Milne, were directed to accompany us. We attended meetings of ten different trusts, and made arrangements with them for immediately proceeding with several of the variations proposed by Mr. Telford; the trustees, however, were not able to obtain the necessary funds from the Exchequer Bill Commissioners, except in one instance, in consequence of the short period for which their local Acts had to run; and therefore it became necessary, in the Session of 1821, for the Parliamentary Commissioners to obtain another Act, namely, the 1 & 2 Geo. IV. c. 30. By this Act the Exchequer Bill Commissioners were required to advance the sum of 31,000 *l.* to the Parliamentary Commissioners, to be applied by them, according to the schedule of the Act, in executing various improvements agreed to be undertaken by the different trusts. Contracts were made by the Commissioners in the course of last July, for the improvements at Braunston Hill, Cuttle Mill Hill, Little Brick Hill, and at Hockliffe; and in the month of March last, other contracts were made for the improvements at Ketley, Prior's Lee, Cosford Brook, Summerhouse Hill and Meriden Hill; some of these works are already completed. The whole are in progress, and will be completed in the course of next autumn and following spring.

Are there any other improvements, except those you have mentioned, still to be made?—There are several others; for instance, a continuation of the improvements now going on at Prior's Lee; at the hill east of the summer-house between Shiffnall and Wolverhampton; near the city of Coventry; at St. Alban's; between South Mims and Barnet; between Barnet and Whetstone. Mr. Telford has lately made a third Report, pursuant to the order of the Treasury, in which he points out, and gives the plans of two pieces of new road, one from Chirk, by Wellington, to the Cock Inn at Watling-street, by which the road will be shortened seven miles; and another from the canal bridge at Moxley, west of the town of Wednesbury, to Stone Bridge, near Meriden, by which the road will be shortened upwards of two miles.

*Sir H. Parnell,
Bart.*

(13 May.)

*Sir H. Parnell,
Bart.*

(13 May.)

Have the Commissioners taken any steps for securing the proper repairs of this road?—When the Commissioners had to prepare plans and conduct the operations attending the improvements above described, it became necessary for Mr. Telford to employ an assistant engineer for this business; the Commissioners took advantage of this circumstance to appoint him as their resident inspector of the whole road. Through him proper instructions have been given, as to the best method of repairing the road, to all the surveyors between London and Shrewsbury, and the consequence has been that an entire new system has been introduced and the state of the road very much improved.

Jovis, 28^e die Martij, 1822.

SIR HENRY PARNELL, BARONET,
IN THE CHAIR.

Mr. Stephen Palknor Crowther, called in; and Examined.

*Mr.
S. F. Crowther.*

(28 March.)

YOU are clerk to the trustees of the Wednesbury and Birmingham roads;—I am.

Mr. Telford in his last Report to the Parliamentary Commissioners for improving the Holyhead Road has stated that this road is generally very rough and irregular, and in most cases of imperfect shape, and not unfrequently so much broken up as to be evidently nearly worn out; he says there is little appearance of any effectual repair having been lately performed, nor are there any materials provided adequate to the support of a road of such unceasing intercourse; the Committee wish that you should inform them how it has happened that this road has got so much out of repair?—I do not at all attend to the repair of the roads; I am merely clerk and treasurer. I attend the meetings and enter the orders; but give no directions whatever.

Have any complaints been made to the trustees as to the state of the road?—I have heard several people complain; Mr. Evett of Birmingham, one of the coach proprietors has spoken of it. The trustees are very anxious to have the road put in repair.

What is the annual income of this trust?—The tolls from August 1819 to August 1820; the rent of a turnpike-house (not used as such at this time but set to a tenant) to Michaelmas 1820; and Cordley machine to Christmas 1820, after deducting money paid to the machine-keeper, at the Three Mile Oak, 2,115*l.* 6*s.* 6*d.*

How many miles of road are in the care of the trustees?—Fourteen miles three furlongs and seven poles.

How much of that is on the mail-coach road?—Seven miles three furlongs and eleven poles.

Can you state what the sum expended by the year is upon this mail-coach road?—I cannot.

Do you know upon what principle the gross sum is allotted to the respective roads?—I do not.

Have you got the books with you?—I have.

Are there any orders in those books with respect to the repair of this part of the road?—Not as to this particular part of the road. On the 10th of April 1821 there was an order made which I will read: "That our surveyor shall not employ any greater number of labourers than fifteen; and that he shall not pay any greater wages or earnings to any one labourer within any one week than at or after the rate of twelve shillings per week, to or for one labourer, until further orders shall be given to the surveyor by the trustees at a future meeting; also that no further quantity of stones shall be purchased or broken for the use of the roads until the present stock of stone shall be broken and used; and that no horse or team work shall be employed or done by the surveyor, until further orders from the trustees at a meeting." There are more than fifteen men employed now, I have no doubt: I think, from the last weekly bill I looked at, there were twenty-three men employed. I recollect what was stated as a reason for an order being made as to the stones, that there were many large heaps lying by the side of the road, which the trustees found fault with and wished to be used before any fresh materials were brought upon the road.

What bills do you refer to?—The surveyor's weekly bills.

Have you many of those bills with you?—I have several for the last twelve months.

Can

Can you state what sum has been expended on the road in the last twelve months?—I cannot. I have the cash book with me: there are entries of all the money received and paid.

Have the commissioners lately made any considerable improvement in the road in respect to any hills?—Yes.

State what they are.—By lowering the hill at West Bromwich and raising the hollow way.

What expense did those improvements incur?—I should think more than 1,000 *l.* Is that improvement completed?—There are some parts by the sides of the road want levelling.

Did the commissioners pay this out of their annual income?—It has been paid out of the fund of the road.

Without borrowing?—Yes.

Have the commissioners their whole fund at present at liberty for the general and usual repairs of the road?—Yes. The balance due from the treasurer at the last meeting (the 5th of March instant) was 194 *l.* 9 *s.* 11 *d.* the money owing, as far as bills are delivered to me for payment, (there may be more) was 361 *l.* 12 *s.* 1 *d.*

What money have you still to receive in this year on account of tolls?—The monthly rents become due on the 15th instant. I do not know whether the rents for this month are received; the balance I spoke of was due on the 5th instant. There may have been money received and paid since, but the accounts are not made up subsequent to the 5th.

Is there any difficulty in obtaining materials?—None.

To what do you attribute the defective state of the road, as far as you can form an opinion upon it?—Really, I am not competent to speak upon that subject.

Are there not a great number of coal-carts upon it?—A great number.

Do not they carry great weights?—Yes.

What weight does a cart drawn with one horse carry into Birmingham?—I do not know; I have heard the surveyor complain frequently of the injury done to the road by one-horse carts.

Could you obtain for the Committee a return of the actual weights carried in small carts?—I think I could.

Have the trustees any power of weighing them?—I believe they have not; I understand there is a special exemption in the General Highway Act. I think I have heard the surveyor say they carry near two-tons.

What mortgage debt does the trust owe?—2,900 *l.*

What salary has the surveyor?—100 *l.* a year.

What is his name?—James Bullock, junior.

How many years has he had the care of the road?—I cannot tell; several years before I was appointed clerk and treasurer.

Was not it repaired by contract till lately?—It was repaired by contract for three years; and the contractors were, I believe, to repair it to the satisfaction of the surveyor.

Is that contract at an end now?—Yes; it expired the 1st of December 1819.

How much did the different contracts amount to?—The aggregate was 605 *l.* per annum.

How was the surplus between the amount of this sum and the produce of the tolls expended?—I have no other means of answering the question than by referring to the cash book.

Mr.
S. F. Crowther.
(28 March)

Sabbati, 30^a die Martij, 1822.

Mr. Stephen Falknor Crowther, again called in; and Examined.

HOW many miles of the branch road are there under the care of the trustees, and to what places do they go?—From the Cross Guns at West Bromwich to the Nether Trindle near Dudley.

How many miles is that?—Three miles five furlongs and twenty-three poles.

What is the next road?—From Great Bridge, West Bromwich, to the turnpike road near Bilston.

How many miles is that?—Two miles four furlongs and seventeen poles.

What other road is there?—From Trowse-lane, Wednesbury, to Darlaston, five furlongs and thirty-six poles.

Is there much travelling upon those branch roads?—There is.

(30 March)

Mr.
S. F. Croxall.
(30 March.)

Of what description is it, coaches or carts?—Principally for the carriage of heavy materials.

Do you know what portions of the funds of the trust is applied to the repair of those branch roads?—I do not.

Do you know what proportion of the tolls is received upon the mail-coach road?—I do not; as some of the gates on the mail-coach road are set with some of the gates which are not on that road; the Holloway Bank gate, which is on the mail road, and the King's Hill Field gate, which is not on the mail road, are set together for 455 *l.* per annum; the Hill Top gate, which is on the mail road, and the Great Bridge gate, which is not on the mail road, are set together for 453 *l.* per annum; the Three Mile Oak gate, on the mail road, is now in hand; the income from it is very uncertain of course: it produced from the 6th of January to the 2d of February inclusive, deducting the gate-keeper's salary, 17*l.* 3*s.* 2*d.* The Soho Hill gate, which is on the mail road, is let at 621 *l.* per annum.

Is not by far the greater part of the tolls collected on the mail road?—Yes.

Do the trustees apply the tolls collected on the mail road altogether in the repairs of that road, or do they apply any part of them to the branch roads?—There is no separate account kept.

What were the tolls up to August 1821?—From the 15th of August 1820 to the 15th of August 1821, 2,292 *l.*

Did the trustees receive any other income besides the sum of 2,292 *l.* from their tolls?—Yes; the rent of a turnpike-house, 5*l.* 5*s.*; and the Cordley weighing machine produced 23*l.* 7*s.* for three quarters up to Michaelmas: at that rate it would be about 30*l.* a year; in one year the produce was 22*l.* 1*s.*; in another year 40*l.* 18*s.*

Taking the tolls at 2,292*l.* per annum, the rent of the toll-house at 5*l.* 5*s.* and the produce of the Cordley machine 30*l.* a year, this gives a total of 2,327*l.* 5*s.* as the annual income of the trustees?—Yes; from which is to be deducted the money paid to the machine-keeper at the Three Mile Oak weighing machine, which is a losing concern, about 13*l.*

How much interest do the trustees pay upon their mortgage debt?—145 *l.* a year.

Do the trustees allow the surveyor any sum by the week, month or mile, for repairing the road?—No.

In what way do you regulate his expenditure upon the road?—The surveyor produces bills from time to time at the meetings.

Does the surveyor produce any estimate of the work intended to be done before the meetings?—He does not.

Does he receive any particular directions from the trustees for the work to be done?—I believe not.

Do the trustees appoint any committee to examine the work he does upon the road?—I believe not.

In what way are the accounts of the surveyor examined?—They are examined at the respective meetings of the trustees; and if approved, they are signed by the chairman.

What control is there over the surveyor; in what manner is the conduct of the surveyor placed under the regular control of the trustees, or is he left entirely at liberty to do what he pleases?—His conduct is of course discussed at the meetings if there is any occasion for it.

In these discussions have you ever heard his conduct found fault with?—I cannot recollect any particular instance.

Have none of the trustees complained of the present state of the road when he has been before them?—I think they have.

While the road was repaired by contract was it a condition of the contract that the repairs should be done to the satisfaction of the surveyor?—I believe the contracts were in the way mentioned; that the works should be done to the satisfaction of the surveyor.

How long is it since those contracts have expired, and the surveyor has had the management of the road in his own hands?—The contracts expired on the 1st of December 1819.

Has the road been under the entire management of the surveyor since that time?—It has.

Jovis, 28^e die Martij, 1822.

Mr. John Frere Congreve, called in; and Examined.

ARE you clerk to the commissioners for the improvement of the streets of Stoney Stratford?—I am.

What is the title of the Act appointing the commissioners?—The 41 Geo. III.; I do not know the chapter; it was passed in 1801.

What extent of road and street is under the management of the commissioners?—I am not prepared to answer that correctly; there is more than half a mile; nearer three quarters than half a mile.

Does not it include the whole street of Stoney Stratford?—Yes; up to about the centre of the bridge over the Ouse, near Old Stratford.

What funds have the commissioners for improving this road?—The present fund which the commissioners have amounts to the sum of 6,510*l.* which is invested in Exchequer bills, under the direction of the Act of 41 Geo. III. until it can be re-invested in the purchase of lands, which will be done when an opportunity offers. This fund arises from the sale of certain charity estates which were sold by the direction of the said Act of Parliament.

Were they bequeathed to the town for the purpose of this improvement?—Yes; many years ago; near two hundred years ago.

What is the reason that the street of Stoney Stratford has always been in such bad condition?—By this Act of Parliament the commissioners were allowed to sell these estates, and appropriate two-fifths of the produce, which amounted to 2,321*l.* 8*s.* 7*d.* in the pitching and paving and improving the streets, which laid very low before this Act was passed; and the remaining three-fifths, amounting to 3,482*l.* 2*s.* 10*d.* were directed by the Act to be invested in the purchase of Exchequer bills until the interest accumulated to the amount of 6,510*l.* being the produce of the sale of the charity estates; the amount of the original sum for which the estates were sold; so that by appropriating the 2,321*l.* 8*s.* 7*d.* which was expended in pitching about two-thirds of the street, the trustees have from that time been without any fund for the repair of this street.

How long is it since this town was paved?—It was done about 1802 or 1803; it was before I was at Stoney Stratford.

Since that period no money has been expended in keeping it in repair?—A very large sum has been expended, which was subscribed by the gentlemen in the town and neighbourhood, to the amount of more than 1,000*l.* within these few years. In the year 1811 the gentlemen of the town and neighbourhood gave to the trustees the sum of 572*l.* 6*s.* 6*d.* which was applied in repairing the bridge, which was at that time in a very dangerous state; and in 1815 the gentlemen of the town, amongst themselves, on an understanding that the money should be reimbursed out of this fund, subscribed 620*l.*; the first sum of 572*l.* was given to the town. The gentlemen afterwards subscribed 620*l.* it being understood that that should be liquidated by the trustees when their funds would admit of it, and that sum still remains owing to the subscribers.

What has the parish contributed?—The parish have regularly contributed their annual highway rate; nothing more as a parish.

What may that amount to in a year?—I should say from 60*l.* to 70*l.* but I am speaking entirely without book.

During every year since 1803, when the town was first paved, has this been contributed by the parish?—I should say I believe it has; it has been always a bone of contention between the parish and the commissioners. It may perhaps appear incorrect upon calculation, unless I explain what has taken place as to the investment of the charity money; the three-fifths, amounting to 3,482*l.* was invested in the purchase of Exchequer bills in 1801, and it did not accumulate so as to make up the original sum of 6,510*l.* until 1820, taking very near nineteen years; it would have accumulated in a much shorter space but for the loss of interest from the year 1802 to 1805; there were three years that the interest was lost. I merely notice this because the interest would otherwise have accumulated three years sooner.

In what way?—It was lost by the omission of the party, who had the management of those Exchequer bills, in not repurchasing at the time they became due, and reinvesting them.

What is the length of the paved part of the street?—About five hundred yards.

Mr. J. F. Congreve.
(28 March.)

Mr.
J. F. Congreve.
(28 March.)

It appears that these five hundred yards of pavement and other repairs of the street since 1801, have cost the following sums: two-fifths of 6,510*l.* making 2,321*l.*; subscription for 1811, 572*l.*; subscription for 1815, 620*l.*; rates at 6*o**l.* per annum for nineteen years, 1,140*l.*; making the sum of 4,653*l.*?—Yes, calculating as I do; but I do not pledge myself that the rates have been regularly paid every year, for I know it has been a bone of contention; but there are other parts of the town to which the rate has been applied; there is a market-place; the whole of the 572*l.* was expended entirely in the rebuilding of the bridge and erecting the iron fence on each side of it; there are bye lanes at the back of the town which require to be kept in good repair. I perceive in the account of the subscription which is to be reimbursed, on the credit side, a payment of 52*l.* 16*s.* for iron railing for the bridge.

How was the paving done in the first instance, was it by contract?—It was done by contract I believe; it was done before I was there; a man of the name of Kirshaw did it. I should expect there is some entry in the minute book as to that.

Is the whole of the interest now payable upon the sum of 6,510*l.* in the hands of the commissioners for improving the streets?—They are, at this time, in the receipt of the interest of the 6,510*l.* and they have received one year's interest.

Inform the Committee whether it is their intention to take any measures for altering the state of the road and street of Stoney Stratford?—Their first receipt of interest was in the latter end of the month of January; and the trustees held a meeting at the beginning of the month of February; at that meeting they directed the money so received, to be immediately appropriated; it appeared upon a statement that the balance they then had in hand was 124*l.* 10*s.* 6*d.* after paying a very long standing bill which had been occasioned by the annual purchase and re-investment of the money by the sale of the Exchequer bills. This business was in the hands of some professional men in London; they made their charges, and those charges were paid off immediately on the receipt of the interest money, that left a balance of 124*l.* in the hands of the trustees, who directed that the 24*l.* 10*s.* 6*d.* should be applied to the payment of some small bills to persons who were very much in want of money, and that the 100*l.* should be laid out in the purchase of materials and in applying them to the immediate repair of the street; in repitching as far as it would extend; they also directed that the stones should be procured from Marston Jabbet quarry, in the county of Leicester. The kind of stones they have ordered are of these dimensions: from five to six inches wide on the surface, and from eight to nine inches deep; that was the size recommended by Mr. Worthington who has been sending materials for that particular purpose to Coventry.

Mr. Telford in his Report to the Parliamentary Commissioners represents the absolute necessity of taking up the whole of the present pavement at Stoney Stratford, and replacing it in a proper and scientific manner so as to obtain a well-formed and sound-paved surface, for the accommodation of general travelling; will the commissioners be able with their funds to undertake such an improvement?—The commissioners have no power to borrow money upon the credit of their funds, therefore I conceive they would not, unless they had further powers granted to them by Parliament for borrowing money.

The Committee on the whole may understand from you that it is the intention of the commissioners to take immediate steps for the improvement of the streets of Stoney Stratford?—Yes, so far as their funds will admit of it. I have cast my eye through the Act again, and I find that there is no power of borrowing money upon their funds.

In what manner do the commissioners spend their money at present; under whose superintendence; have they a surveyor?—No, they have not at present any more than the regular surveyor of highways for each parish; but it is their intention to place it in the hands of some person well acquainted with paving, who is not yet determined upon. The Committee are aware that the commissioners have only been able for about a month to do any thing; the commissioners are very anxious to meet the exigencies of the case, but they feel their hands tied by this Act.

Do you think the commissioners would agree to have their town improved upon the same plan as has been acted upon between the trustees of the Hockliffe Road, and the Parliamentary Commissioners; that is, by borrowing a sum of money in the first instance from the Exchequer Bill Commissioners, and vesting it to be expended under the directions of the Parliamentary Commissioners; at the same time with the consent of the town commissioners as to any particular plan?—I am not able to answer that question; I know the commissioners feel, that however

anxious

anxious they may be to repair the streets and roads, they have not the power to do it at once; whether they would like to be dispossessed of their trust, I do not know; I should say not.

The question went to the arrangement of a plan by which the mere practical work of the new paving of the town should be executed in a skilful manner without interfering with their rights or setting aside the trust?—I understood the question to be, whether they would consent to borrow money upon the same principle as has been adopted by the road trustees, and place the management of the improvement under the direction of the Parliamentary Commissioners; I think if any plan could be adopted to enable them to be possessed of a sufficient sum of money to put the street into proper repair they would very gladly accede to it.

You have mentioned, that at one period there was a loss of interest on the part of the commissioners, in what way did that occur?—It occurred by reason of the non-renewal of the Exchequer bills from 1802 to 1805.

Are those funds standing in the name of the Accountant General of the court of Chancery?—Yes.

In what manner does the management of them get into other hands?—I know very little of Exchequer bills; but I should suppose, those bills when purchased in the name of the Accountant General, are delivered over to the party who acts immediately on behalf of the commissioners, and that it is his business to watch those bills when they become payable.

Do you mean to state that the original bills are handed over to the party interested on behalf of the commissioners?—Yes; when they are repurchased, they are handed over to the same gentlemen (Messrs. Philpot and Stone), who watch the time of the advertisement appearing for their renewal.

Could not it be accomplished as well by allowing the securities to remain in the actual custody of the Accountant General?—Probably they do remain in the custody of the Accountant General; here is the book of the Accountant General made up, and it appears upon his book what was invested in the purchase of Exchequer bills; and those bills I conclude are given to Messrs. Philpot and Stone, who watch the time for their becoming renewable.

Has any application been made to endeavour to obtain the interest that you have been deprived of in consequence of the neglect of the person acting for the commissioners?—The commissioners presented a memorial to the Lords of the Treasury for the return of the interest money which was lost in the way I have explained, and the Lords of the Treasury said they could not listen to the application.

The road between Stoney Stratford and Old Stratford is entirely without any fence or protection, excepting at the bridges, is it the intention of the commissioners to put that part of the road in a more secure state?—It is; they are waiting for their funds; it is their intention to continue the iron railing the whole length, but they must pave the street in the first instance; that is the most crying evil.

Have you any accounts of the receipts and payments of the commissioners?—Yes; I have an account of the receipts and payments, in the first instance, of the two-fifths of the original sum; I have an account showing in what way that was applied; I have an account showing the application of the gift to the town; and I have also an account of the appropriation of the sum of 620*l.* subscribed by the town.

Be so good as to state in what manner the commissioners became possessed of their present fund.—They became possessed of this fund by the sale of certain charity estates situate in the town of Stoney Stratford, and in the parishes of Kelverton and Wolverton, in the county of Buckingham.

How did they become possessed of those estates?—They were given for those charitable purposes, and they have descended from time to time to the present trustees.

By will?—By will or deed.

Who was the original donor?—I do not know, but they have been applicable to charitable purposes for more than two hundred years.

Previous to the Act of Parliament, were they applicable to charitable purposes?—Yes; to the same purposes as the interest of the 6,510*l.* is now applicable, the improvement of the town. The Act merely recites that the trustees are seised of certain estates particularized therein for certain purposes; the original trusts were these: "In trust for the purposes of maintaining and keeping in repair the bridge and causeways, and the highways on both sides of the said town of Stoney Stratford, and

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Mr.
J. F. Congreve.

(28 March.)

Mr.
J. F. Congreve.

(28 March.)

and also for the discharge of the fifteenth or any other charge to be taxed or imposed upon the said town."

The book you have laid before the Committee appears to commence with an account dated January the 9th, 1802; on the debit side is the produce of the sales of those estates, 6,510*l.* is that the same fund which the commissioners now have?—It is; it has re-accumulated to that amount, after expending 2,327*l.* in paving the town.

This account appears to close on the 15th October 1807, have you an account from that period to the present time?—No, I have not, further than the account of the expenditure of those sums subscribed by the town and neighbourhood. I presume the Committee allude to the expenditure of any sums of money from any other source, for instance, the highway rates; I have not those accounts.

Have you an account of the expenditure of the sums subscribed by the town?—I have.

[The Witness was directed to furnish copies of the above Accounts.]

How many commissioners are there?—There are now residing in Stratford nine; several of the trustees appointed some years ago have left the town and are not resident in the county, but there are nine resident trustees.

Who is their treasurer?—Mr. John Oliver.

What at present is the income of the trustees?—The interest of the 6,510*l.*; but that depends very much on the state of the market of Exchequer bills.

Veneris, 24^o die Aprilis, 1822.

Mr. David Henry Stable, called in; and Examined.

Mr.
D. H. Stable.

(24 April.)

HAVE you the management of the road at the Highgate Archway?—As acting director I have.

The following is Mr. Telford's observation upon the state of this road, made in the Report to the Commissioners for the improvement of the Holyhead Roads, on the 19th of last March: "Found the whole of this road in a very imperfect state, the surface irregular and apparently breaking up in many places; and as few materials are provided for repairs, the future prospect is forbidding;" be so good as to inform the Committee how it happens that this road is so much out of repair.—In consequence of the limited state of our funds we are not enabled to procure materials in a sufficient quantity to put it into thorough repair, and consequently we are obliged to repair the road only where we find it absolutely necessary to do it.

What income is derived from the tolls collected on that road?—About 2,500*l.* from the tolls, and the remainder consisting of about 300*l.* from rentals.

What part of this is expended on this road?—We have always expended 420*l.* per annum.

What is the whole distance?—A mile and three quarters or thereabouts.

That is nearly at the rate of 250*l.* for a mile?—Yes, much about that.

What is the reason that a larger part of the tolls is not applied to the repair of the road?—On account of our debt which is very considerable, nearly 40,000*l.*

Do you pay interest on that debt?—Yes, we have paid a very considerable interest at one period; we have fortunately reduced it, and now the greatest extent of interest is 5 per cent. in some instances three, in others four, the greatest extent is five.

Do you make any dividend amongst the proprietors?—None, not a sixpence, nor never shall I am afraid; the fact is, our expenses are such we can neither afford clerk or surveyor, our directors are obliged to take it in turn entirely upon themselves to attend to the business, and our meetings are held at each others houses to save expense.

Have you any prospect of being able to lower the interest still further?—I am afraid not.

If this road was to become very much out of repair would not the income of the company be very much injured?—Certainly.

Would it not then be the interest of the proprietors to devote a larger sum to the repair of the road to avoid the loss of the toll?—I should think so; but there is much difficulty in bringing the gentlemen to think so; we had great difficulty in reducing the interest as we have done; we had annuities at 12 per cent.

Is there any clause in the Act to secure the application of any part of the toll to repair the road?—I believe so. *Mr. D. H. Stoble.*

The road is under the direction of a private company?—Yes, entirely. It is our decided determination to abandon the rag-stone we have used; and make use of flint, and we shall get it up in that quantity to enable us to put it in thorough good repair. (24 April.)

Have you ever proposed to the creditors to diminish the rate of interest?—No, we never have; it is only during the last two years we have accomplished what we have done.

Is there any considerable traffic upon the old road through Highgate?—I should say not; I am pretty sure there is only one four-horse coach that goes over the hill.

Some few years ago was not there a considerable traffic?—Very considerable.

Is your road better than it used to be at that period?—Decidedly; it is now getting a bottom.

Then the increase of travelling by the arch-way road is to be attributed to the improvement of the road?—Certainly; the post-boys and coachmen all say so; and they are the best judges.

If the road is suffered to go much more out of repair than it is at present, may not this traffic be lost and the benefit of it to the creditors?—I should think so.

If the creditors would forego their interest for one year, upon the condition or being repaid as the funds hereafter would admit, would not such an arrangement enable you to put the road in better repair, and give them better security for their money?—Certainly, I have no doubt about it.

Are the creditors very numerous?—Not as to the large debts; the large debts lie in a very narrow compass: the Hope Insurance Company, myself, and Mr. Nash the architect; then there are some floating bonds taken by the proprietors at large; they are only in 50*l.* bonds.

Would it be matter of any considerable difficulty to call together the creditors to make some arrangement of the nature alluded to?—No; except that the parties would be very averse to lower their interest.

What materials do you use?—The road originally used to be repaired with gravel; within these last two years the company have repaired the road with such material, consisting of stone, as they could procure near London; they have within the last six months procured a quantity of Kentish rag which has not answered their expectations, and they are now procuring a quantity of flint stone from the neighbourhood of Weymouth, which they trust will enable them to repair their road with effect.

On what terms are you able to obtain that flint?—To be delivered at White Friars Wharf at 7*s.* a ton, broken fit to be put on the road.

How much will it cost to bring that material from the Wharf to the road?—Including wharfage and cartage I should consider about 5*s.* a ton.

Could you not get flint cheaper by the Grand Junction Canal from the neighbourhood of Berkhamstead?—I have not inquired as to that point.

Of what quality is this flint?—It appears to be exceedingly hard and very good indeed.

Is it a black flint?—It is more of a greyish flint; it is a dark-grey.

APPENDIX.

Appendix, No. 1.

Mr. TELFORD's Third Report, by order of the Lords of the Treasury.

HOLYHEAD ROAD, between CHIRK and LONDON.

IN consequence of an Order from the Lords of His Majesty's Treasury, dated 13th February 1818, and of explanatory directions from the Commissioners of the Holyhead Road, commanding me to proceed to survey and report upon the state of the Mail Coach Road from Holyhead to London, I gave in one Report dated 30th June 1819, and a second dated 5th June 1820, but I had not at that time sufficiently satisfied myself as to some further variations that required extensive surveys, and a great deal of consideration. These surveys having been made, I now have to submit to the Commissioners the following Report upon this long line of most important communication.

CHIRK to WELLINGTON and WATLING-STREET.

In my second Report I say, "I caused a survey to be made of a line from Chirk, passing through Ellesmere and Wellington to the Watling-street, one mile east of Haygate, in order to ascertain whether any considerable improvement in the general line of the Mail Road, might be made by taking advantage of the existing roads which lie in that direction, but it appears that no valuable improvement can be made in the way of shortening the distance, unless an entirely new line of road be made from Chirk to Wellington. This would incur a very considerable expense, but the road would be shortened about five miles." As the instructions I received required me to point out every variation by which the main line of communication between Holyhead and London might be improved, I could not leave so important a matter, as the practicability of shortening it by so many miles, in a state of uncertainty; I therefore made, at several times in the course of last and preceding summers, inspections of the country between Chirk and Wellington, and gave the necessary directions for preparing the surveys and plans of a direct line of road between these two points, which accompany this Report.

Plate II.

It appears from these Plans that the length of a new and direct line of road from Chirk Bridge to the Pheasant Inn, in the town of Wellington, will be 26 miles 440 yards; from the Pheasant Inn to the Cock at Watling-street the distance is 1,176 yards by the present road; so that the whole distance from Chirk Bridge to the Cock at Watling-street, by this new line, will be 26 miles 1,616 yards.

The distance from Chirk Bridge to the Cock Inn at Watling-street, by Oswestry and Shrewsbury, as the mail now goes, is 34 miles 1,700 yards, so that the saving of distance by the new line will be 7 miles 184 yards.

The section of this new and singularly direct line of road shows that it is as free from hills as a road ought to be; and I am able to add, that the country through which it will pass, presents no difficulty of any kind in the way of making this road at the usual rate of expense attendant on making good roads through clear and level districts of country.

BILSTON TO STONEBRIDGE.

In my former Report I have fully described the circuitous and hilly character of the present road from near Bilston to Birmingham, also the inconvenience and danger of the streets of Birmingham. In order to obviate, in some degree, those great defects and serious impediments to safe and rapid travelling, I proposed in my Second Report to make a new road of about three miles in length across the collieries south of Wednesbury to West Bromwich, and to make a short piece of new road from the bottom of Coleshill-street in Birmingham to Small Heath toll-gate. In consequence however of the numerous defects which would still remain after incurring a great expense in those variations, and sundry serious difficulties which presented themselves, I undertook a more extended examination of the districts adjacent to the present roads; that is to say, first, through the middle of the town of Birmingham, in the line of Bull-street, down Car's-lane, and across the Rea River and Warwick Canal to the bottom of the steep hill nearly opposite the ruins of Mr. Taylor's mansion-house. Secondly, from the Soho toll-bar, by the northern skirts of the town, and up an old road to the Small Heath toll-gate; but both
these

these involved sundry difficulties, and would incur much expense without affording any material advantages. These disappointments led me to examine the country to the north-east of Birmingham, where I found it practicable to form a new line of road from the Canal Bridge west of Wednesbury, at Moxley, along a favourable valley to Stone Bridge, near Meriden, upon the Coventry Road, by which the distance would be shortened 2 miles. The Map and Section which accompany this Report show that in this direction, besides saving of distance, there will be scarcely any hills. Whereas, upon the present road, there are the following:—

Plate I.

From Wednesbury Bridge to summit of the country	-	165	feet	rise.
To bottom of Soho Hill	- - - - -	188	-	fall.
From ditto to top of ditto	- - - - -	54	-	rise.
From top of Soho Hill to bottom of Snow Hill	- - - - -	46	-	fall.
From bottom of Snow Hill to top of Bull-street	- - - - -	60	-	rise.
From top of Bull-street down to Rea River	- - - - -	109	-	fall.
From Rea River to Small Heath	- - - - -	98	-	rise.
From Small Heath to Stone Bridge	- - - - -	164	-	fall.

IMPROVEMENTS IN HAND.

The following improvements that were proposed in my Second Report are now in progress, contracts for making them having been completed by the Holyhead Commissioners, with the concurrence of the respective Trusts concerned in them, according to the Acts of the two last Sessions.

1. The Improvement at Ketley.
2. Ditto at Prior's Lee.
3. Ditto at Cosford Brook.
4. Ditto at Summerhouse Hill.
5. Ditto at Meriden Hill and Pickford Brook.
6. Ditto at Braunston Hill.
7. Ditto at Cuttle Mill Hill and Valley.
8. Ditto at Little Brickhill.
9. Ditto at the Hills west of Hockliffe.

The improvement at Cuttle Mill has been opened to the public since last March; that at Brickhill is finished; and a part of the improvement at Hockliffe is in use: as the contracts are made with skilful and competent persons, who are subject to a constant and strict inspection, it is quite certain that the whole will be completed by the periods stated in the respective contracts, and for the sums agreed upon.

But there will remain to be carried on after these improvements are completed, the following works already described in my Second Report, all of which are greatly wanted.

1. The Improvement from the tollgate at Prior's Lee to the top of Knowles's Bank.
2. The - - d° - - of the hill east of Summerhouse.
3. The - - d° - - between Weedon and Towcester.
4. The - - d° - - south of Coventry.
5. The new approach west of St. Alban's.
6. The new road from South Mims to Barnet.
7. The improvement of the hills at Barnet and Whetstone.

When the whole of these are completed, there will be no line of road, 260 miles in length, so perfect in any part of the United Kingdom, or in Europe, as this road from Holyhead to London; and the Commissioners will have the satisfaction not only of having conferred great practical benefit on all persons directly interested in this line of communication, but also of having established an example by which all other bad roads may be equally well reformed.

London, 16th May 1822.

Thomas Telford.

Appendix, No. 2.

REPORT of Mr. THOMAS TELFORD to the Commissioners for the Improvement of the Holyhead Road, dated the 19th of March 1822; upon the state of the Road from Shrewsbury by Coventry to London.

Report from Inspection made in March 1822.

FROM the eastern boundary of North Wales, at the village of Chirk, or rather at the Ceriog river, to the town of Shrewsbury, the road being under the management of the Holyhead road repair Commissioners, I avoid entering into details more connected with the North Wales districts, which are the subject of a separate Report.

11 March.—From Shrewsbury to Emstry the road has been brought into a tolerably good form, the sides cleaned, and the surface partly improved.

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Emstry

Emstry hill has been improved in the cutting and embanking; but the metal has not been properly selected and applied. From Emstry to Atcham the road has been widened and brought into a tolerably good shape; but the gravel has been put on without screening or proper selection. The best remedy would be to lay a coat of properly broken Overlay hill stones for 16 feet in breadth in the middle of the road, and for 6 inches in thickness.

Near Atcham inn, and opposite Lord Berwick's west gate, the road should be raised.

From Atcham to Tern bridge, the road has been much improved as to shape and surface; but some cross drains are still wanting, and also keeping the sides quite dry. From Atcham to the Horse-shoe public house, some parts have been widened, and the general shape improved.

At the Horse-shoe, there is no appearance of improving the direction; it remains, to the disgrace of that part of the road, very much in the shape of the before mentioned sign.

From the said Horse-shoe to the termination of the Trust, the road has been widened in sundry places, by cutting off awkward bends.

The general form of the road under this Trust has been improved, and part of the surface lifted and the stones broken; and when this operation has been extended over the whole Trust, an effectual improvement will have been accomplished.

WELLINGTON TRUST.

From the western extremity of the Trust to the Hay-gate, the road has had its sides cleaned and the general form improved; great part of the surface lifted, and the stones broken, so as to render it smooth.

At the Hay-gate, the road has been widened and improved.

From the Hay-gate to the Cock inn, the road has been partially improved. Its completion may be expected in the course of the present season; and as excellent metal can be procured from Overlay hill and Ercal quarry, there is a prospect of the road being rendered substantially good.

From the Cock inn to near Ketly bank, the road has been considerably improved in form and surface.

Adjacent to Ketly, in consequence of the projected improvement, little has been done; but that being now contracted for, no time will be lost in commencing practical operations.

From Ketly works to the termination of this Trust at the Shropshire canal, the improvement lately executed is in a tolerably fair state, but will require unremitting attention to preserve it so.

SHIFFNAL TRUST.

March 12.—On the amount of the projected improvement, little has been done between the Shropshire canal and the toll-bar east of Prior's Lee.

From thence to Shiffnal the road is in a tolerably good state, but there is no appearance of great exertion as to improvement. Through the town of Shiffnal the pavement is singularly defective, and requires immediate improvement, unless an entirely new line is adopted on the south side of the town, which is both practicable and advisable.

WOLVERHAMPTON TRUST.

From Shiffnal to Cosford brook, much has already been done in clearing out the sides, bringing the road into a proper shape, and cutting down the hedges; very considerable quantities of good materials are now lying in heaps along the edge of the road, and some broken and put on the road.

There are also some cinder heaps, which may do for the sides.

In sundry places, the forming the sides has produced a considerable quantity of earth and mud; this should be removed.

In ascending the windmill hill, a cross drain is still wanting.

In approaching Cosford brook some trees on the right render the road damp; they should be lopped and thinned, and some hedges are not yet cut.

From Cosford brook to Whiston cross, the road has had the right-hand side drain mostly cleaned, its form and surface much improved, and great quantities of good materials provided; a considerable portion of which have been very well broken.

The hedges, along this part of the road, have been mostly cut very properly.

From Whiston cross to Summer-house hill, similar observations may be applied; the road being generally in good condition.

Adjacent to the Horns public house, a cross drain is still wanted, this has formerly been repeatedly pointed out; near to the 25-milestone some trees have been very well lopped, but a hedge on the right still requires to be better cut; there are still too many unlopped trees on the left near the Horns.

In consequence of the intended improvement, little has been done west of the Summer-house. On the hill east of ditto, the shape has been much improved, and also the road surface for a few feet in the middle, but requires to be extended on each side close up to the fences, the whole width being too small.

From

From this last mentioned hill to Tattenhall hill, the road has been generally improved, by clearing the sides, and mending its shape and surface; a very considerable portion of good materials is provided.

But on the eastern side of Summerhill a cross drain is wanted; and at its bottom, besides a cross drain, the hollow should be raised about one yard.

Along Wrottesley park, on account of trees on both sides of the road, the surface is very damp, and in some places broken up; some cross drains are wanted in this district to carry off water, which lies on the upper side, and partly upon the road.

From Wergs village the surface is rough and uneven, and the sides full of water; and hence, all the way to Tattenhall hill, the surface should be lifted, and put into a proper shape; a very considerable quantity of stone is lying on the sides of the road; some hedges still remain to be cut.

At Tattenhall hill the improvement is still in progress. From thence to Wolverhampton the whole of this road is very rough, on account of having been made with too large stones; the whole should be lifted, and brought into a more perfect form; the hedges are not sufficiently cut, and some trees require to be lopped.

13 *March*.—From Wolverhampton to the termination of this Trust, the road is in general in bad condition; the surface is broken and irregular, the shape is imperfect; there are either unnecessary ditches in the sides, or they are not sufficiently cleaned and defined; the footpaths are too high, and the field roads encroach too much on the public road; cinders are too much substituted for stone (Rowley Rag;) some stone has been provided.

BILSTON TRUST.

The new improvement having been well made, remains generally in good shape, but has been evidently much neglected; the sides are filling up, and the middle wearing down, which if not immediately and carefully attended to, will suffer the road to fall into disrepair, and render it difficult to be restored.

Through the village of Bradley the same observations will apply; and from thence to the termination of the Trust, at Wednesbury, the road is rough and much broken up, the sides have either unnecessary deep ditches, or are not cleaned out; the road is, in fact, fast wearing out.

Through the whole of this Trust there is of late an evident want of attention; and the materials employed are only cinders, which very soon grind to dust or mud; whereas excellent stone is plentiful in the immediate vicinity.

Some of the hedges also require to be cut down.

BIRMINGHAM and WEDNESBURY TRUST.

From Wednesbury to Bromwich hill top, over the flat between the town and the bridge, and on the long steep ascent up the hill, the surface is rough and irregular, and the cross section is imperfect; some very good stone has been provided, and when broken and a proper quantity laid on, and the shape improved, this long and heavy hill will be rendered as perfect as it is capable of.

From Bromwich hill top to the end of the Trust, this road is generally very rough and irregular, in most cases of imperfect shape, and not unfrequently so much broken up, as to be evidently nearly worn out; there is little appearance of any effectual repairs having been lately performed, nor are there any materials provided adequate to the support of a road of such unceasing intercourse. Some hedges require to be cut; many trees overshadow the ground; and there are many heaps of road scrapings which require to be removed.

The management upon this Trust requires immediate investigation, and more vigorous and effectual measures enforced.

BIRMINGHAM TOWN TRUST.

From the termination of the Wednesbury Trust at Livery-street, in descending Constitution hill, the form of the road is singularly defective, being deeply concave, and apparently neglected and worn out; it requires to be wholly re-made without delay. Towards the bottom, or flat, the form is much better, but requires attention. The surface of Snow hill is soft and heavy, and should have a coat of hard well broken pebbles.

Found this street quite obstructed by numerous coal carts, evidently forming a market there.

Over the summit of this hill the pavement has lately been much improved, as also on the eastern descent of the hill from opposite St. Martin's church to near the bridge; and if from the church up the Bull ring to the junction of New-street and High-street, the present rough slippery pavement was taken up, and the ground lowered about a foot on the summit of both streets, the driving-way down the hill widened, and its surface laid flat, and reconstructed, with a good foundation and coat of properly broken stones, the difficulties and dangers now attending this great thoroughfare, would be removed.

BIRMINGHAM and STONE BRIDGE TRUST.

March 14.—After leaving the Oxford road, the top of the small hill should be cut down, and the hollow through which the Warwick canal passes, should be raised about three feet; this would ease the steep bank. This short Trust of nine miles has been much improved; the general shape is good; it has, in many parts, been under-drained, and had the side drains cleaned out; a part of the road has been lifted, the stones properly broken, and the surface reconstructed; in most parts the fences have been cut, and a very considerable quantity of materials has been provided and laid in heaps along the road side, part of which has been broken very properly. But in order to perfect this road, there still remains to be performed, 1st, the remainder of lifting and reconstructing the surface; 2d, near the 4-mile-stone, one cross drain is wanted, and two more near the 8-milestone; 3d, at Lindon hill, a considerable portion of road is too narrow, and should be made wider, chiefly on the south side, and have some cutting and embanking performed; 4th, some more of the hedges require cutting, also some trees. A county bridge, called Stone Bridge, is much too narrow; its approaches also want raising and metalling.

COVENTRY TRUST.

From Stone Bridge to Coventry, the general shape of the road has been much improved, and the sides cleaned out; hard metal has been laid in the middle part of the road, and is gradually extending in width; some parts of the surface still requires to be lifted and improved; and in some few places, the trees and fences still remain uncut.

Through the town of Coventry (which is under District Commissioners) the streets, besides being inconveniently narrow, are crooked and ill-paved, although a toll is levied at each end of the town for the purpose of improving them.

From Coventry to Knightlow hill, the same observations will apply as those made on the former part of this Trust.

From Knightlow hill to Dunchurch, much has been done to shape the road and improve the surface; and a considerable quantity of materials is lying in heaps along the side of the road, and part broken. But on account of the formerly very imperfect state of the road, the surface, in the middle, is still thin and weak, and requires still much more material to strengthen it in the middle, and increase its width.

The lofty trees which form a row on each side of this road, especially the Scotch firs, considerably exclude the sun and air; and render the repair of the road much more expensive than it ought to be. As these trees have reached their full prime, it is hoped the proprietors will be induced to fell them; as the object of mere ornament should certainly give way to public convenience.

DUNCHURCH and OLD STRATFORD TRUST.

From Dunchurch to Daventry.—At Dunchurch, saw a considerable quantity of Nuneaton or Hartshill stone laid down for this part of the road. For some miles from Dunchurch the surface of the road is in a very imperfect state, being soft and much rutted; the sides have lately been in several parts cleaned out, and the cross section improved as to form. Near Willoughby, the surface has been considerably improved by Nuneaton stone in the middle, and gravel in the sides, and the side drains have been partly cleared; but the former state of the road having been so imperfect, much more material is required to strengthen it in the middle, and increase the workable part in breadth.

From Braunston to Daventry the same observations will apply; and there are also very extensive banks of scrapings on the right-hand side of the road.

Adjacent to Daventry some men had begun to lift the road.

Braunston New Improvement.—At Braunston a very considerable quantity of Nuneaton stone has been laid down for the new improvement; the embankment between the two canal bridges has been commenced. From the village through the fields, the road has been formed, a rail road has been laid down; and the waggoning, from the deep cutting near the summit, to the aforesaid embankment, commenced. From the summit to the junction with the present road, the new road has been set out, fenced, and partly formed; at its termination a very considerable quantity of bottoming stone has been laid down. At the town of Daventry, both approaches are inconveniently steep and crooked, and the street is narrow and ill paved.

March 15.—From Daventry to Towcester, considerable progress has been made towards clearing the sides of the road, and bringing the cross section into a proper shape; on a part of the road near Weedon, where properly broken Nuneaton stones have been laid, the surface is smooth and firm. In other parts, the limestone of the country has been employed with considerable effect; but being more easily ground down it has either been nearly worn out or cut into ruts. Under the present circumstance it is recommended to pursue the practice of drilling, that is, filling the ruts with the hardest sort of stones broken small, a few at a time and frequently repeated, until about fifteen feet in the width has been made firm, smooth and hard, and afterwards to increase the breadth by degrees; but when the sides are, at any time, brought into a proper shape, the same should, without delay, be covered with gravel, or any inferior sort of stones, quite up to the footpath or fence, otherwise the trampling of cattle, &c. will, during the first rainy weather, poach the whole again into an irregular form, which will retain the water.

Up on

Upon some parts of this Trust, the hedges have been cut very properly, and will admit the sun and air to dry the road surface, which will prove an incalculable advantage; but in many other instances, along most of this Trust, the hedges yet remain uncut, and almost for the whole length tall hedge-row trees, on the south-west side, so thick as to be very injurious; so much so as to leave pools of water standing on the road, which on a surface composed of soft materials contributes in no small degree to their hasty decomposition, and entails a very heavy expense upon the toll funds.

The whole of the remainder of this Trust is subject to similar observations.

Cuttle Mill Improvement.—The several operations have been carried on in a very regular and systematic manner as to cutting, embanking, slopes forming, metalling and binding; the whole is now in such a state of forwardness as not only to exhibit a complete specimen of road-making, but to ensure a speedy completion; the public already enjoy a considerable part of the improvement.

In order to do away with all possible danger upon the high embankment on each side of the bridge, I have, with the concurrence of Sir Henry Parnell, directed a dry stone wall, with a coping set in lime mortar, to be built along each side of the road, instead of posts, rails, and quicksets.

The extension of the improvement up the hill to Plump Park corner, is now proceeding, and, when completed, will perfect the communication across this formerly incommodious and dangerously deep valley.

Stoney Stratford.—The street of this town remains, as regards pavement, in the dangerously rugged state as formerly described, and has been the cause of some severe accidents.

From Stoney Stratford to Brickhill much pains has, in general, been bestowed, and very considerable progress made in bringing the road into a good shape. The materials, whether gravel, pebble stones, or limestone, have been carefully selected, and, as far as practicable, judiciously applied; and the result has been a very sensible improvement of surface; but the formerly very imperfect state of the road has not yet been completely removed, nor a sufficient strength of working surface obtained. Ruts, of course, are not unfrequent, and the breadth of metalling requires to be considerably increased. For drilling or filling up the ruts, small broken hard stones are recommended, and the sides may, as formerly pointed out, be made with inferior stones and gravel.

In sundry instances the hedges remain uncut, and tall hedge-row trees and belts, more especially along the S. W. side of the road, as at the 49-milestone, can only be effectually removed by the interference and direction of the proprietors, who, when made fully aware of the expense and inconvenience they entail upon the great lines of intercourse in this industrious country, will I have no doubt, give immediate instructions to their agents to remove this just cause of complaint.

Brickhill Improvement.—This improvement is in such a state of forwardness as to promise an early completion. Every operation displays the attention and skill of both inspector and contractor, and is at present in a state to exhibit a specimen of the different steps necessary in perfect road-making.

Through the village of Brickhill the sides of the roads are very irregular; the mounds of earth, and other incumbrances between the road and houses, should be removed; a curb-stone and neat small pavement should be substituted, and steps put to the doors where wanted. If this was done, and the middle properly shaped and covered with a coat of broken pebbles, the whole would correspond with the new improvement, and add much to the beauty of the village.

March 16.—From Brickhill, considerable pains have been bestowed in shaping the road and trying to improve the surface; but the materials hitherto employed are unfit for the middle or working part, which requires hard well-broken pebbles or flint-stones: the materials now used might then be laid along each side. It is unfortunate also, that where such destructible materials are used, that there are extensive belts or plantations along the S. W. side of the road. The cuttings and embankings of the most northern of the Hockliffe hills have been carried on with much energy, and are in a state of great forwardness; a considerable portion of the road has been formed, and the bottom pavement set with good materials, in a very proper manner. Some top metalling has been dug in the adjacent fields, and some part of it broken.

The cutting and banking between the south hill and the village has been begun.

It is hoped that the Trustees of this road will embrace this opportunity of employing the contractor to raise and improve the road on the south side of the bridge, and extend it to where an improved surface has been left off.

From Hockliffe to Dunstable the road is generally in a very good state, both as to form and surface. It cannot be too strongly urged to employ only well-broken pebbles or hard flints for the middle or workable part of the road, and use the gravel only for the sides. The sides should also be more distinctly defined; and where there is a considerable breadth of waste ground, lower than the road, it should be divided off by a small mound, along the outside of which the scrapings might afterwards be laid until raised to a proper height.

It is desirable that about three or four feet more should be taken from the upper part of Chalk hill, and carried to and laid to raise the surface at the northern extremity of the embankment.

The road over the embankment is generally hard and smooth, and also the lower part of the cutting. Thus far the horses generally trot; but here, if treated as above described, they

they would trot all the way: as the chalk stands almost at any slope, no inconvenience would arise from slips, &c. From Chalk hill to Dunstable the surface and shapes are good. From Dunstable to the southern extremity of the Trust, near St. Alban's, a distance of twelve miles, the road, taken altogether, is in the most perfect condition of any equal distance between Shrewsbury and London: the sides have been generally cleared out and defined; the cross section has been brought into a good shape; the surface made hard and smooth by well-broken flints, and the hedges generally properly cut.

The footpaths still require modelling more perfectly. A very ample provision of flints are laid along the side of the road: it is hoped Mr. Stokes will preserve the favourable character his road has deservedly acquired. Near the southern extremity of the Trust, I was sorry to observe some indifferent gravel laid on the middle of the road. I need only point out the impropriety of this, and suspect it has been done without the Surveyor's knowledge.

From the commencement of the St. Alban's Trust to the entrance of the town, the road surface is pretty regular and smooth, but is so narrow, crooked, and sunk below the surface of the adjacent fields, as to render it unfit for so great a thoroughfare; its total removal only can remedy such radical effects.

The inconvenience and danger arising from the steepness and narrowness of the street, in the northern part of the town, have been frequently represented as incurable, except by a new line of road.

From St. Alban's to Ridge hill considerable pains have been taken in shaping the road; but too much soft gravel is still employed in the middle, instead of hard flints: much of the road is also so narrow, crooked, and either sunk below the level of the adjacent fields, or confined by high mud banks, as to give it more the character of a lane than that of a great thoroughfare. At Ridge hill, instead of hard flints or pebbles, soft gravel has been here too generally employed, and from which a hard and smooth surface is not to be expected. That this desirable surface may be obtained, is evident, from the northern part below the connection with the old road having been repaired with hard flints, for some time after its first construction, having continued hard and smooth without any great portion of attention.

From Ridge hill to the southern termination of the Trust near Barnet, the road is well shaped and smooth, but the surface is heavy from the nature of the material employed. The gravel, in most of the districts between South Mims and Barnet, is of a superior description from what has been described, but still unfit for the middle of the road. The general direction is more crooked and hilly than in any equal distance between London and Holyhead. Indeed, it must be evident from this account, that most of the Trust requires improvement.

WHETSTONE TRUST.

Between Barnet and Whetstone, a succession of inconvenient hills and hollows also exist which may be easily remedied.

This Trust has, of late, been much improved in its shape and mode of executing its repairs with better selected gravel, applied with more judgment and economy, than formerly; but this gravel is still very improperly used in the middle of the road, which renders it loose and heavy; nothing but hard well broken stones or flints can stand the work of this great thoroughfare; and from the great revenue collected at the toll-gates, the public have a right to expect the most perfect road that can be constructed.

ARCHWAY TRUST.

Found the whole of this road in a very imperfect state, the surface irregular, and apparently breaking up in many places; and as few materials are provided for repairs, the future prospect is forbidding. It is hoped the proprietors will exert themselves to maintain this much frequented district of road, which, if suffered to fall into disrepair, will not easily be restored.

From the Islington Road to Kentish Town, the road is hard and smooth, and in good condition; some materials lie along the road side.

From Kentish Town to the City road, the road is hard and generally smooth, and is evidence of the perfection to be obtained by using proper materials in a judicious manner: this is an instance within the reach of general observation, and is deserving the serious attention of persons interested in promoting the most approved modes of intercourse.

UPON the whole, the state of the road from Shrewsbury to London, shows that the Surveyors have made considerable exertions to improve it; and that they have attended to the rules which were drawn up and published for their instruction, by the Parliamentary Commissioners. The use of the road-level is gradually bringing the transverse section of the road to the proper shape; and the defining of the road, with proper side drains to 30 feet, gives the whole line a neat uniformity, and makes it appear, that all the work is conducted on a well-adjusted principle. The supplying all the stone-breakers with proper hammers and iron rings of 2½ inches diameter, has nearly accomplished the great object of getting the stones broken to a proper size; and the discontinuing of the use of gravel for the repairs of the 18 middle feet of the road, has been attended with all the good effects which were anticipated.

The

The general attention which the Trustees have paid to the letter of the Parliamentary Commissioners of November 1821, concerning the cutting down of hedges, has been of the greatest service; but the Trustees should not allow so many trees to remain, as noticed in this Report; many of these trees are full grown, and a greater number so crooked or bushy, as not to be of any value, therefore no loss can be sustained by the owners, in cutting them. The Trustees should be aware, that trees add at least 25 per cent to the expense of keeping a road in repair; and therefore, that out of every hundred pounds they spend in repairing a road sheltered with trees, 25 *l.* goes to repair the injury which is occasioned by the owners of trees not removing them, and should be set down to their account.

Tho^t Telford.

49th March 1822.

Appendix, No. 3.

(Circular.)—Copy of a Letter from Mr. John Easton to Mr. John Jones, Clerk to the Trustees of the Shrewsbury District of Watling-street Road.

Sir,

Daventry, Tuesday, 6th November 1821.

I AM directed by the Parliamentary Commissioners for improving the Holyhead Road, to express their anxious desire to see some effectual steps taken by the Trustees over the whole line, in the course of the ensuing winter, for removing all obstructions to the complete improvement of the same, such as trees, hedges and banks raised as fences, which at present overshadow and narrow the road; and to request you will take the earliest opportunity of calling the attention of the Trustees of the Shrewsbury District of Watling-street Road to the state of the trees, hedges and banks, so as to have the same cut down and removed, in obedience to the powers vested in them by the different existing Acts of Parliament.

The Parliamentary Commissioners feel satisfied that by so doing the roads might not only be kept in a superior state of repair, but that the expenses of these repairs might be greatly diminished.

I am, Sir, your most obedient servant,

John Easton.

Letters, the same as the above, were sent to the following Gentlemen:

1. Mr. Thomas Pugh Leegomery, clerk to the Trustees of Wellington Trust.
2. Robert Tisher, esq. solicitor, Newport, ditto - - of Shiffnal Trust.
3. John Moreton, Wolverhampton - ditto - - of Wolverhampton Trust.
4. — William, solicitor, Bilston - ditto - - of Bilston Trust.
5. Stephen Crowther, attorney, Wed- } ditto - - { of Wednesbury and Birmingham
nesbury } Trust.
6. Roger W. Gem, attorney, Birming- } ditto - - { of Birmingham and Stonebridge
ham } Trust.
7. John Woodcock, Coventry - - ditto - - { of Stonebridge and Dunchurch.
Trust.
8. Edmund Singers Barton, attorney, } ditto - - { of Dunchurch and Stratford Trust.
Daventry - - - }
9. John Frere Congreve, attorney, } ditto - - { of Stratford and Hockliffe Trust.
Stoney Stratford - - - }
10. — Williamson, solicitor, Luton - ditto - - of Puddlehill Trust.
11. J. S. Storey, ditto, St. Alban's - - ditto - - of Dunstable and Pondsards Trust.
12. Isaac Pigott, ditto, St. Alban's - ditto - - { of St. Alban's and South Mims'
Trust.

Appendix, No. 4.

REPORT of Mr. John Easton, Assistant Engineer under Mr. TELFORD;
and resident Inspector of the Improvements and Repairs of the Road
from SHREWSBURY to LONDON.

HOLYHEAD ROAD.

REPORT upon the state of the different Trusts under my inspection, pursuant to
the Instructions of THOMAS TELFORD, Esq. dated at Edinburgh the 14th day of
October 1820.

IN obedience to these instructions I went to the different local Surveyors upon the road,
with them examined the state thereof, explained to them the printed general rules drawn up
for their instruction, and pointed out the repairs necessary to be made in conformity to these
rules.

For each of the Surveyors a proper road-level was directed to be made; hammers of
different weights, with elastic handles, were furnished as patterns; cast iron rings of
2½ inches diameter, for sizing the stones, were provided; pronged shovels for filling them;
picks for raising the upper course of ill broken stones, and rakes for regulating the surface
of the road were made and distributed.

SHREWSBURY DISTRICT of the WATLING-STREET ROAD.

(ROBERT JONES, Surveyor and Contractor.)

I.—Materials:

1. Gravel.

1. Pit, Abbey foregate. Mixed quality; some of it very good.

Digging and once screening	-	-	-	-	-	-	per yard	-	s. d.
Separating the large from the small, and breaking the large	-	-	-	-	-	-	-	-	1 2
Carriage of it, say 1 mile at 1 s. per load of 1½ ton, or about 31 cubic feet	-	-	-	-	-	-	-	-	1 8
									10
									3 8

Note.—One-third of the above may be fit for the middle 18 feet of the road, and the
remainder good side material.

2. Meal Brace gravel. The pit is situated about 2 miles from the English bridge over
the Severn, and affords the best breakable road material; much of it is of a dark blue
colour, like Rowley stone.

Getting	-	-	-	-	-	-	-	per yard	s. d.
Breaking	-	-	-	-	-	-	-	-	1 -
									1 8
									2 8

3. Emstry Pit is situated about 1 furlong south of the road, at a point about three quarters
of a mile to the eastward of Emstry toll-gate.

Getting and screening, inclusive of 3d. for the land - - - per yard - 1 s. 6d.

Note.—Of this one-third may be fit for the middle of the road and one-third for the sides,
so that the part proper for making a complete hard road may be estimated at per yard - 2 s. 6d.

Breaking, &c. as above.

2. Field stones or pebbles:—Good in general, but mixed, being of the quality of the
pit pebbles.

Picking up from 1 s. 2 d. to 1 s. 6 d. per load, or average	-	-	-	-	-	-	per yard	-	s. d.
Breaking	-	-	-	-	-	-	-	-	1 1
Carriage 1 mile	-	-	-	-	-	-	-	-	2 -
									10
									3 11

3. Quarry stones:—Overly Hill Rock is a very dark red stone, compact, and of excel-
lent quality, some of it much harder than others; it is quarried and broken into pieces
of about 2 lbs. at

Breaking it small	-	-	-	-	-	-	-	per yard	-	s. d.
Carriage, 2 miles	-	-	-	-	-	-	-	-	-	2 -
										1 6
										1 9

5 3.

II.—Contract

II.—Contract Work :

1. What part of the work is performed by contract ?

Getting gravel ; screening and breaking it ; picking stones and breaking them ; quarrying stones ; picking up, shaping, &c. &c.

The prices, excepting picking up and the operations connected with it, are stated above.

For picking up, &c. the price varies from $5\frac{1}{4}d.$ to $1s.$ per yard in length of the road. This variation is owing to the size of the stones, to raise which, in some instances, one foot deep must be picked up.

2. What part is performed by day labour ?

Laying new materials upon the road, clearing out the sides, scraping off the puddle, and carrying away water ; also carriages. Wages from $9s.$ to $10s.$ per week.

III.—Team Work :

1. What is paid for teams ?

Teams of 3 horses may be had in the district for $12s.$ per day.

2. How many hours do they work ?

Eight hours per day, and travel 16 miles.

Mr. Jones has paid for 4 horses and two tumbrils $21s.$ per day of 9 hours, 3 horses constantly drawing and one horse in the pit ; he however does all his work with his own horses.

IV.—What quantity of statute duty is performed upon the road ?

V.—How far are the general rules complied with ?

1. Form :—Mr. Jones is now repairing the road under a new contract, in which he is bound to lift all his road, not yet raised, in 2 years from 14th November 1821. In performing this operation he is to shape the surface of the road properly ; what he has done already is pretty nearly right.

2. Drainage :—Attention has been paid to this, but still more is necessary. Two over-runs opposite Lord Berwick's wall should be made covered drains, and great care ought to be taken to lay and keep the side drains dry.

3. Trees and Fences :—The greatest part of the fences have been cut, and where new ones have been made, in widening the road, the Surveyor has very properly planted the thorns on a low border. The trees remain as they were.

4. Materials, preparation of :—The Surveyor (and contractor) has made considerable proficiency in cleansing and breaking his materials ; still, however, neither of these operations are so perfect as they ought to be, particularly on the new works, and when applying a coating of new materials.

5. Materials, disposition of :—To this also more attention ought to be given. The materials have not been properly applied on the new road at Emstry, nor have the middle and side materials been so neatly distinguished in laying them on as they ought to be. A great improvement has been made opposite Lord Berwick's wall by raising the sides with gravel got out of the Severn, and new forming the road.

6. Management of Labour :—The work upon the road is conducted with considerable judgment and activity, and so as gradually to improve the road.

WELLINGTON TRUST.—(JAMES PHILIPS, Surveyor.)

I.—Materials :

1. Gravel :—Quality weak and small ; colour rather red, and some white.

Getting and breaking from - - - $3s. 4d.$ to $3s. 6d.$ av. $3s. 5d.$ p' cubic yd.

Distance from $\frac{1}{2}$ to 4 miles.

2. Field stones :—Mostly pebbles ; colour blue ; }
quality good, from - - - $3s. 6d.$ 4s. av. $3s. 9d.$ p' cubic yd.

3. Ercal Quarry stone :—Colour rather white, with some blue veins, which are the best, but lie under a deep cover, about 35 feet. Quality : not a strong material, but being easily ground down forms a very smooth road. It is about 5 furlongs from the road and costs - - - $3s. 3d.$ p' cubic yd.

4. Wrekin Quarry stone :—Colour red, white and grey. Quality very good ; about $\frac{1}{2}$ mile from the road, and costs from - - - $4s.$ to $5s.$ av. $4s. 6d.$ p' cubic yd.

5. Overly Hill Quarry stone :—Colour red, and some grey. Quality very good ; about a quarter of a mile from road, and costs from - $3s. 6d.$ to $3s. 9d.$ av. $3s. 7\frac{1}{2}d.$ p' cubic yd.

6. Admason quarry :—Colour red ; quality, will make a good road ; one mile from road, and costs from - - - $3s.$ to $3s. 6d.$ av. $3s. 3d.$ p' cubic yd.

343.

7.—Cinders :

7.—Cinders:—Quality, very different. When properly selected and prepared they make a very smooth, pleasant running road; even then they last only a short time before the road becomes dusty or puddly, and begins to break up. They require repairs, at the longest, every 8 months, and sometimes in not more than four. Distance to carry from 3 to 4 miles; costs - - - - - 2s. 6d. to 3s. 6d. av. 3s. p' cubic yd.

II.—Contract work:

1. What part of the work is performed by contract?
Getting gravel, and screening it; picking and quarrying stones, and breaking stones. The prices of these operations are stated above.
Lifting the road, shaping it, and relaying the broken stones, is executed by the perch of 5½ yards, and costs from 6d. to 1s. or average 9d. being nearly - 1½ d. p' lineal yd.
2. What part is performed by day labour, and the wages?
Scraping the road and other surface work is performed by the day.
Wages from - - - - - 14 d. to 20 d. per day, av. 1s. 5 d.

III.—Team work:

1. What is paid for teams?
From 9s. to 10s. av. 9s. 6d. for 3 horses wrought in 2 carts by 1 man and a boy.
2. How many hours do they work?
Eight hours per day.

IV.—What quantity of statute duty is performed on the road?

From the statement furnished me by the Surveyor, it appears that the statute duty is converted into money for the whole of the district, the amount of which is 289l. 10s. 10½ d. for the Holyhead Road, and 465 l. 7s. 8d. for the parish roads; total 754 l. 18s. 6½ d.

V.—How far are the general rules complied with?

1. Form:—The Surveyor proposes to give three inches of convexity for the middle 18 feet in the width of the road, and for other widths in proportion.
2. Drainage:—Little more than has been done seems to be necessary to complete the drainage of this Trust, excepting strict attention to the side drains.
3. Trees and Fences:—The fences have been cut, and where the road has been widened, along Street-lane, new fences are made. Some belts of planting grow on the north side of the road to the westward of Haygate and to the eastward of Street-lane. On the south side, near the Cock inn, there are some trees which overshadow the road, and in all these cases they are too near it.
4. Materials, preparation of:—The materials are in general well cleaned, and the stones properly broken.
5. Materials, disposition of:—In lifting the present road, due attention has been paid to distribute the materials properly upon the workable part of the road, and give the surface an uniform smoothness, and pretty good cross section. In some places the good materials have been scattered too far towards the side drain. Where the road has been widened, the materials are, at present, lying in rather a confused state, particularly on the eminence to the eastward of Haygate.
6. Management of Labour:—Every attention has been paid to let the work by contract. Even scraping has been let at from 12s. to 16s. per mile.

SHIFFNAL TRUST.—(Mr. M^r ADAM, Gen^l Surveyor; PHILIP SAUNDERS, Sub-Surveyor.)

I.—Materials:

Cinders or slag is the only material used in this Trust, with a slight covering or binding of furnace ashes.

It is procured at Snedshill works, near the western end of the Trust. With proper care in the selection, breaking and laying on, it makes a good road for from 4 to 8 months, when repairs become necessary.

II.—Contract Work:

1. What part of the work is performed by contract?
The cinders are selected and broken to go through a 2½ inch ring, at the bank, for - - - - - per yard - 0s. 9d.
Carrriage for two miles - - - - - 2s. 3d.
Ditto - for 4½ miles to Shiffnal - - - - - 3s. 9d.
The above includes filling either by the waggoner himself, or by a person paid by him.
2. What part of the work is performed by the day?
Laying the broken cinders upon the road, scraping off the waste, removing it in wheelbarrows, and keeping the side drains clear. This requires the work of three men, and their wages - - - - - per week - 9s. 0d.

III.—What

III.—What is paid for teams, and how many hours a day do they work?

The whole of the team work, excepting the statute duty, is done by measure, at the price stated above, viz. 2s. 3d. for 2 miles, and 3s. 9d. for from 4 to 4½ miles. Eight hours is a day's work.

IV.—What quantity of statute duty is performed upon the road?

About 20 years ago the whole of the statute duty, and also the composition money, was transferred to the highways in the parish of Shiffnal, excepting 21 days of a team in each year, for the division of Prior's Lee. A team with three horses, and one man for driving and one for filling, are stated in the requisition sent by the Surveyor.

V.—How far are the general rules complied with?

1. Form:—In making repairs upon the road, the Surveyor has gradually improved the cross section of it, and likewise the surface longitudinally. Still there is room for improvement in both.

2. Drainage:—This portion of road has been laid dry, but wherever there is an overrun, a cross drain should be made instead thereof.

3. Trees and Fences:—Excepting at Prior's Lee, and from Knowles's bank towards Shiffnal, there are very few trees in the hedges in this district, and the above are on the north side of the road.

The fences have been cut and kept low.

4. Materials, preparation of:—The cinders are now selected and broken carefully and properly.

5. Materials, disposition of:—The cinders are laid upon the road, so prepared, in thin coatings; and sometimes a thin covering of furnace ashes are added, to induce the carriages to go upon them. The Surveyor has picked up the large cinders laid upon the road upon the old system, and it now runs smooth.

6. Management of Labour:—Four men are generally employed in procuring and preparing the cinders, by the yard, and 3 in laying them on, keeping the surface clean and smooth, and in repairing side drains and outlets.

SHIFFNAL and WOLVERHAMPTON TRUST.—(Powis, Surveyor.)

I.—Materials:

1. Gravel:—In the valley at Acton, and also near Bonnigale, small quantities of gravel have been got, but the beds are thin, particularly Acton, (which lies a little to the northward of Cosford Brook.) Quality, easily ground down; about half the bulk, after it has been twice riddled, is breakable and fit for the middle of the road.

Getting and twice screening, at from 10d. to 1s. average - 0s. 11d. per yard.

2. Field Stones or Pebbles:—Very good, being of the quality of Hartsbill stone in general, but much of it of a lighter colour, and some of it of a blue cast.

They are procured on both sides of the road between Shiffnal and Tettenhall, but the principal places are about Lizard, Tongue, Upton Common, around Cosford, about Albrighton, and the neighbourhood of Bonnigale and Summerhouse.

	s.	d.
Picking - - - - -	per yard	1 -
Carriage - - - - -	per mile	1 -
Breaking - - - - -	per yard	2 6
		4 6

From Lizard, about 2½ miles from Upton, they are laid upon the road, at a short distance from Upton, at about - - - - - per yard - 4s. 1d.

3. Quarry stones:

1. Rowley rag stone, of a dark blue colour, is a material of a very hard, durable quality.

It is carried and delivered at Wolverhampton wharf for 3s. 0d. }		s.	d.
per ton of 22 feet, or - - - - -	p' yard	3	8
Wharfage - - - - -	0s. 2d.	-	2½
Breaking - - - - -	2s. 0d.	-	5½
			6 4
Cartage 200 yards from the vessel - - - - -		-	4½
			6 8½
Ditto to the road, say 2 miles - - - - -		-	2 5
			9 1½

2. **Bilston stone, from iron stone mines**:—This stone is procured by the miners when working out the iron stone. Quality much inferior to the Rowley, but still when properly broken it makes a smooth good road, as long as it lasts.

Cost at the pit 1 s. per ton of about 22½ feet, or	-	-	per yard	-	1	2½
Breaking	-	-	-	-	2	-
Carriage	-	-	-	-	2	5

5 7½

4. **Cinders**:—These have been very properly applied as a bottoming to the broken stones, and are of the same character as those described above; only the Surveyor has never selected and broken them well.

II.—Contract Work :

1. What part of the work is performed by contract?

Getting and screening gravel, procuring stones of every description above stated, carriage of these by canal and by carts, and breaking them.

Note.—The surveyor sifts all his broken stones, and measures them before paying the breakers; and all the siftings, even those from the small or dust of the broken stones, are discounted and not paid for to workmen. The prices are stated above.

2. What part of the work is performed by the day?

Scraping the road, raising the large stones, and forming it; laying on the materials and carrying away the waste by gang carts, drawn by horses hired for the purpose.

Note.—The Surveyor has one man for each division of his road, of from 2 to 3 miles, who works along with one or two more, conducts the work, and is accountable to him for the proper execution of it. These men have become anxious to have their respective portions better than others.

Wages are	-	-	-	-	{ 2 men at 1 s. 6 d. per day.
					{ 8 men at 2 s. - ditto.

III.—Team work :

1. What is paid for teams?

For one horse to draw a gang cart, 5 s. per day.

2. How many hours a day do they work?

Eight hours per day.

IV.—What quantity of statute duty is performed upon the road?

186 days, of a team with 3 horses.

6 Ditto - - - - 2 ditto.

5 Ditto - - - - 1 ditto.

V.—How far are the general rules complied with?

1. **Form of road**:—The form of the road has been much improved of late; but still, in widening it, (being much too narrow in several places,) attention is necessary to make it uniform. Some portions of it are still too flat, or rather the side drains are not so completely and neatly cleared out as they ought to be. In some cases, again, such as below Whiston Cross, the side drains have been taken out too deep, and in place of a straight or handsome curving line being kept, the zigzags of the old fences have been followed, even to an extent beyond the proper breadth of the road. This is the case on the eastern descent from Upton, which gives the road an awkward appearance.

2. **Drainage**:—The Surveyor has drained wet places opposite Wrottesley Park, has made covered drains for water from springs near Bonningale, and has been at pains to keep the water running on the sides of the road there from getting upon it. He has also put drains into the road over Kingswood Hill, and in other places where wet appeared; and, excepting a few overruns, which ought to be converted into covered drains, and where the ground is low, some filling over them, the road is now in a dry state.

3. **Trees and fences**:—No steps have yet been taken to lop or remove trees overhanging the road between Oaken and Wergs, by which it is evidently so much injured. On being applied to, Mr. Wenman said he would fall those opposite Wrottesley Park, but has not done so. Besides these, the young plantations near Shiffnal, and to the eastward of Upton Common, on the south side of the road, are now in that advanced state as to do material injury, by screening it from the influences of the sun and wind. They ought to be lopped and thinned. Along the road between Whiston Cross and Summer-house, but particularly opposite Bonningale, the hedge-row trees require lopping, or rather they ought to be removed. A considerable portion of the hedges have been very properly cut; still, however, some pieces remain uncut, which must be attended to very early in next season.

4. **Materials, preparation of**:—The Surveyor has provided for almost all his breakers, blocks of wood, in which are imbedded strong pieces of iron, a little concave, upon which the stones are broken. The stones are held down by an iron ring, with a handle on one side about eighteen inches long, and a loop on the opposite side, which, with a staple driven into the block, forms a joint upon which it moves. The breaker sits, holds down the stone by the ring with one hand, and breaks it through the ring with the other. The hammer used is heavier than those recommended by the printed rules, with a short thick handle.

By

By persisting in the use of this machine, the workmen have acquired dexterity, and can break about a ton per day. By this method every stone is broken into pieces, sufficiently small, but not into so good shapes as can be done by an experienced good breaker standing and using both his hands with a proper hammer. The machine process appears to me to be also the slowest. Particular care is taken to clean the broken stones and other gravel materials before laying them upon the road. When cinders are used they are generally laid on unbroken.

5. Materials, disposition of:—The materials used have been so disposed in the middle of the road, as to give the greatest part of it, over the Trust, an uniform hardness and smoothness, by which travelling is greatly expedited. The sides in many places require to be covered with metal also; and a considerable portion of the road from Wergs to Wolverhampton must be stocked up, shaped and properly covered with well-broken stones.

Where cinders alone have been used, such as between Wolverhampton and the western end of the Trust, in several places, sufficient care has not been taken to dispose of them properly. They have been laid down without due preparation, the surface broken a little, some furnace ashes thrown over them, and left to be smoothed by the action of the wheels and tread of the horses. The Surveyor however is gradually discontinuing this practice, and generally uses cinders only as bottoming.

6. Management of labour:—The Trustees have furnished the Surveyor with two gang carts, for which he hires horses, and performs all his carriages with them, and statute duty teams. His labourers are therefore employed in removing spoil, and drawing the materials upon the road with these carts, each of which holds exactly a ton, or about 22 cubic feet of stone. The other day-labourers are employed in scraping the road, and laying on the prepared materials, generally two together, one of whom is a confidential person, and goes over a certain length of the road, doing all the surface work, clearing side drains, and opening the proper outlets for water. The procuring and preparing materials are all done by measure or weight.

BILSTON TRUST.—(GREEN, Surveyor.)

I.—Materials.

1. Gravel:—None.

2. Field stones or pebbles:—None.

3. Quarry stones:—These are got out of the iron stone pits, either broken off the ore, or from an irregular stratum above it. The quality of it varies; some is rather soft and easily reducible into puddle, but other parts are hard and very good materials.

It is very considerably inferior to Rowley-hill stone; I should conceive not half the value, as a road material.

	s. d.	s. d.
Cost at the pit	1 -	p' yd. 1 2
Breaking, hammers furnished by the workmen	2 -	2 4
Drawing, average of the road 2 ½ miles	2 -	2 4
	5 -	or 5s. 10d. p' yd.

4. Cinders:—Mr. Joseph Price, who manages the business of the road, is now using cinders, and estimates them as follows:

12 loads, each 2 tons weight, are drawn into a basket of iron, made on purpose, with a rake, so as to leave out the bad cinders and refuse, and filled into carts by 2 men in one day, and they are broken to a fair size at the rate of 4 tons, by each man in one day. The above 12 loads, or 24 tons, are carried upon the road for 16 s. and the estimate will stand thus,

	£. s. d.
24 tons, cartage	- 16 -
24 D ^o selecting and filling, 2 men at 2 s. 8 d.	- 5 4
24 D ^o breaking - - - 6 ditto - 2 s. 8 d.	- 16 -
— Spreading ditto	- 1 10
	24) 1 19 2
	- 1 7 ½ p' ton.

Again. For a shorter distance:—

	£. s. d.
18 loads, or 36 tons, cartage	- 16 -
Selecting and filling, 3 men at 2 s. 8 d.	- 8 -
Breaking - - - 9 ditto at ditto	1 4 -
Spreading	- 2 8
	36) 2 10 8
	(- 1 5 p' ton.

	£. s. d.
	2) - 3 - ½
Average	- 1 6 ½

To this, ashes for binding is to be added,

By Mr. Frost's contract,—One ton of stone, costs - 6 -
One ditto of cinders - 1 6 ½

Mr. Frost's contract includes ashes; but as greater measures of cinders are got for the money, the value of the ashes may be sunk in the value of the cinders.

II.—Contract work :

1. What part of the work is performed by contract?

Formerly the repairing of the whole road, excepting the pavement of the street of Bilston, was let in contract to James Frost, and he let a considerable part to others by subset contract. Now he procures the stone, carries, draws, breaks, spreads and covers with ashes by contract.

2. What part of the work is performed by the day?

Procuring, breaking and spreading cinders; also other surface work. s. d.

Wages per day :—Mr. Frost's men, good experienced labourers - - - 2 8

Other good labourers, without experience - - - 2 -

III.—What is paid for teams?

Three horses and one man, to travel 16 hours per day, costs 16s.; and 8 hours is one day's work.

IV.—What quantity of statute duty is performed upon the road?

None; the whole of the statute duty and composition money is applied to the repairs of the highways in the parishes through which the turnpike road runs, and is not adequate to keep them in repair.

V.—How far are the general rules complied with?

1. Form :—The new roads on each side of old Bilston are the prescribed form, and that of the remainder of the road is very much improved. The sides of the new road, on the west of the town, require clearing out, and the middle ought to be carefully kept up by thin coatings, wherever necessary, of well-broken, hard stone.

Attention should also be paid to keep the surface of the old road good; at present it is considerably deranged and out of repair.

2. Drainage :—The drainage of this road appears to be complete.

3. Trees and fences :—There are no trees in this district to injure the road. The hedges in general have been cut; a small part however remains uncut.

4. Materials, preparation of :—The stones for repairing the new road to the west of Bilston have not been broken so small as they ought, and the surface, on that account, is not so smooth as it should be.

5. Disposition of materials :—During the currency of James Frost's first contract, in which he was bound to repair with cinders only, the Trustees agreed with him to lay down stones in sufficient quantity upon the side of the road to keep it in repair, at their own expense; he, in lieu of implementing his first contract, to break the stones to the size prescribed by the rules, and to lay them upon the road. During this new arrangement, the road continued to improve to the end of his first contract. Now the Trustees appear to have relinquished this plan, and to have returned to the use of cinders, which, according to the above statement, is much cheaper for one dressing, but which, owing to the unavoidable frequency of its recurrence, will lead to more expense than if good stones were applied at once, as far as the funds would go, after keeping in decent repair the other parts of the road.

The cinders laid upon the road are immediately covered with furnace ashes, but do not appear to be so well sorted and broken as they ought to be.

6. Management of labour :—It appears by the foregoing statement, that the labour performed is fully equal to the value given for it, both as to men and horses.

BIRMINGHAM and WEDNESBURY TRUST.—(JAMES BULLOCK, Surveyor.)

I.—Materials :

1. Gravel :—Quality very good, principally of the colour of Hartshill stone, and equal to the best of it. The Surveyor never digs any, but occasionally purchases a little raised in trenching and levelling ground.

Delivered on the road, once screened, the cost is from { average } s. d. s. d.
2s. to 2s. 6d. - - - - - { per ton } 2 3 or 2 8½ p' yd.

Separating and breaking the stones in it, may be about - - - 1 - - 1 2 -
3 3 - 3 10½ -

Of this, one ton may be fit for the middle, and two for the sides of the road. Assuming the value of 3 yards at the first cost, viz. 8s. 1½d. and calculating 1 yard of the breakable to be worth 2 of the small, after the large is separated from it, the - s. d. s. d.

small part, or 2 yards, would be - - - - - 4 - 4 or 2 - 4 p' yd.

To which add for the screening - - - 1 - - - 6 -

The remaining yard of breakable would be - - - 5 - 2 - 2 6½ -

To which add the 2s. for screening and breaking - 2s. - - - or 6s. 4d. -

2. Field or pebble stones :—Quality the same as the best stones in the gravel.

Price delivered upon the road, per ton - 2s. 4d. } 4s. 10d. for 23 feet, or 5s. 8d. p' yd.

Breaking - - - - - 2s. 6d. }

This is both a better and cheaper material than the gravel.

3. Quarry

3. Quarry stones :—The only quarry stone in the country which can be brought to this road, is Rowley-hill stone, or Rowley-rag; it is a dark blue stone of excellent quality. Broken at the quarry and carried to the whole road from Three Mile Oak gate to Birmingham, the price is - - - - - 8s. per ton of 22½ feet, or 9s. 7d. p' yd.

From Cross Guns to Three Mile Oak gate, 6s. 6d. - - - or 7s. 9½d. —

From - ditto - to Wednesbury and Darlaston, 6s. 6d. - - - or 7s. 9½d. —

The above prices were agreed upon between the Trustees and the occupier of the quarry, Mr. Whitehouse, and a part is delivered.

Note :—In an open pit, about half a mile from the road, a little above New Inn, in the parish of Handsworth, excellent pebbles imbedded in clay appear; the clay seems to be very hard, which would make the getting expensive. This pit may be very valuable, in the event of field stones becoming scarce.

II.—Contract work :

1. What part of the work is performed by contract ?

Procuring gravel and stone; breaking; stocking up the road; breaking, shaping, and relaying the same materials.

The prices of gravel, stone and breaking are stated above.

For stocking, breaking the materials raised, shaping, relaying the same materials, and where necessary adding new materials, furnished the men ready broken, the Surveyor is giving 1½d. per square yard. This price was fair where the stones raised were large, and in great quantities; where this is not the case, 1½d. per yard, or even a little less, may afford very good wages.

2. What part is performed by the day ?

Scraping the road, keeping the surface even and smooth by filling ruts and hollow places; filling the scrapings into carts, to be carried to the land by the farmers, clearing the sides and water outlets, wages - - - - - from 1s. 6d. to 2s. 6d. per day.

III.—What is paid for teams?

For 3 horses and 1 man - - - - - 14s. per day.

The Surveyor thinks 3 horses and 1 man may now be got for - - - 12s. —

1. How many hours a day do they work ?

The general rule is 8 hours per day, but the Surveyor limits the number of loads to be carried, according to the distance, and in this way gets more work done. He is also attentive to regulate the filling the carts by measuring the stones for the breakers.

IV.—What quantity of statute duty is performed upon the road ?

None; the Surveyor never received either team work or composition money, and could give no information as to quantities assessed upon the parishes through which the road passes. The whole must be applied to the highways.

V.—How far are the general rules complied with ?

1. Form :—This has been properly attended to in making the repairs, by stocking, &c.; and the Surveyor engages to shape the whole in the same way as the work proceeds. At present the surface is very rough, and full of hollow places.

2. Drainage :—As far as carrying off water rising near the road goes, much has been done; still, between Three Mile Oak public-house and the Hill top, in Handsworth parish, springs rise into the side drain next Sandwell park, which should be carried off. The side drains in the hollow between the public-house and toll-gate are too deep; rough tiles ought to be laid in these, and the ground raised over them. This ought also to be done in those places where the smallest quantity of damp appears in the side drains, particularly from Handsworth Hill top towards New Inn and Birmingham.

3. Trees and fences :—From the top of Handsworth Hill to New Inn, where the road is sunk below the fields from 6 to 9 feet or more, and where the side slope on the south side is perhaps ½ horizontal to 1 perpendicular, some trees are growing near the top of the slope which ought to be removed.

The hedge on the top is partly holly and partly white thorn, and the holly has risen into large bushes, which overshadow and greatly damage the road. On the north side the foot-path is fully a yard above the road, and the hedge may be from 4 to 6 feet above the foot-path. I recommended to the Trustees of the Trust to remove the foot-path to the south side of the road, to slope the side banks similar to the entrances into the fields, and sow them with grass seeds, and to plant new quicksets very nearly level with the top of the road. The Trustees approved of the plan, and would be ready to adopt it did their funds admit. Some pieces of the hedges between Bromwich Heath and Handsworth Hill top require cutting. The trees on the south side of the road, at Soho, overshadow it, and some also on the north side.

4. Materials, preparation of :—The attention paid to teach the labourers breaking stones to a proper gauge, when making the pattern piece at Cross Guns, has had good effects. Some of the men still remain upon the road as the best breakers. Still there is a disposition in workmen to slight so important a work, which, considering the difficulty of getting even well-broken pebbles to set, on account of the smoothness of the surface, which must remain, and which often forms so large a part of the broken pieces, cannot be too strictly performed. Whenever pieces of too large a size are observed, after the stones are put upon the road, the Surveyor is advised to have them raked off and re-broken.

Any gravel that may have been used for the sides has, in general, been properly cleansed.

5. Materials, disposition of:—The materials have, for a considerable time past, been employed in keeping the road from being broken through; now the Surveyor is stocking it up, breaking all the large stones, shaping the road, and applying what new materials may be necessary in aid of the old stock raised. In a very short time he has accomplished nearly a mile and three quarters of the worst parts in different places; viz. part from the end of Oldbury road to Dudley road, passing the Cross Guns, up to the top of Bromwich Heath, Sobo Hill, and at the top of Constitution Hill, where the Trust terminates.

6. Management of labour:—The breaking and carrying of stones have always been done by task, but while partially repairing the road, to save it from ruin, day-labourers were employed; now almost the whole is let by the task.

BIRMINGHAM and STONEBRIDGE TRUST.—(JAMES MOORE, Surveyor.)

I.—Materials.

1. Gravel:

1. Small Heath Pit, near the road:—Quality good; colour from a mixture of white and red to red, with small white specks, the same as Hartshill, which is general over this district, with here and there a sand-stone pebble.

Getting and thrice screening - - - per yard - 1s. 8d.

Note:—One-third of the heap may be fit for the middle of the road.

2. Haymill Pit:—Got on the brook side, near the bridge, in water. s. d.

Raising - - - - - 10

Screening twice - - - - - 10

1s. 8d.

Note:—This is excellent material, and one-half of the heap may be used in the middle of the road.

3. Yardly or Briscoe's Pit:—About three quarters of a mile from the road, and is a deep pit.

Raising and twice screening - - - - - 1s. 8d.

Note:—Nearly half of the heap may be middle material, but the quality is rather inferior to the two former pits.

4. Lyndon Hill Pit is close to the road.

Raising and twice screening - - - - - average - 1s. 7d.

Note:—About five-twelfths of the heap may be fit for the middle of the road, and the quality fully better than Small Heath.

5. Sheldon Pit.

s. d.

Raising - - - - - 6

Screening twice - - - - - 10

1s. 4d.

Note:—This is a small gravel, but, as pit gravel, of the first quality. Only about one-third can be reckoned fit for the middle part of the road.

6. Stonebridge, or Underhill's Pit, lies about 3 furlongs from the road, on the side of the stream.

Raising and twice screening - - - - - per yard - 1s. 8d.

Note:—About seven-twelfths of this pit may be used in the middle of the road, and the quality is the best.

In all the pits the large stones are separated from the small as they fall in the pit, most frequently by hand. The mass is then put through a riddle with meshes $1\frac{1}{2}$ inch square, as the gravel is thrown out, and those which remain in the riddle are broken without any more screening. The remainder is riddled a second time; and the Surveyor used to apply part of the best, unbroken, to the middle of the road, under the idea that the large was not sufficient for the travel.

ABSTRACT.

Raising and preparing the whole - - - - - per yard - 1s. 8d.

Breaking the large - - - - - 1 9

Drawing, average - - - - - 1 3

4 8

To this add for spreading - - - - - 2

4 10

The large may always be estimated at double the value of the small, so that in 3 yards, 1 yard of the large is equal to the other 2 of small; thus, 3 yards at 1s. 8d. - 5s.

Half of which, for 1 yard of large, is - - - - - 2 6

Add breaking - - - - - 1 9

Add carriage to road - - - - - 1 3

Total of one yard of broken stones laid on the road - 5 6

Quarter of the 3 yards for one yard of small - - - - - 1 3

Add carriage to road - - - - - 1 3

Total of one yard of second gravel laid upon the road - 2 6

As

As the average proportion of breakable material in the different pits is more than one-third, after being twice screened, the good may be rated at more than the above.

2. Field stones or pebbles:

These are procured from the fields almost over the whole line, but in small quantities to the eastward of Wells Green.

Picking and carriage to the road	per ton	s. d.
Breaking		2 5
Filling and spreading		1 6
		3
		4 2

Or, at the rate of $23\frac{1}{2}$ feet to the ton - - - - - 4s. 9½d. p'yd.

Stones are also procured from Coleshill Common, and delivered at Elmdon, at - - - - - s. d.

Breaking	4 - p' ton.
Filling and spreading	1 6
	3

At $23\frac{1}{2}$ feet per ton - - - - - 5 9 - or 6s. 7d. p'yd.

3. Quarry stones:—There are none in this district.

II.—Contract Work.

1. What part of the work is performed by contract?

Digging and screening gravel; breaking the stones; carriage of materials; cutting and laying drains; and stocking or lifting the road. The first 3 articles are estimated above; the last, stocking or lifting the road, including breaking the stones raised, shaping the surface by spreading the materials properly over it, has been done of late for 1½d. per square yard. This price is found to be ample; and in some cases a price somewhat reduced, say to 1d. would recompense the workmen. The above price for 20 feet wide, is, for the yard forward, fully 8½d. or - - - - - per mile - 61l. 2s. 4d.

2. What part is performed by the day?

Filling and spreading materials, scraping the road, clearing the side drains, and water outlets, are done by the day.

Wages by the day generally	s. d.
One man has only	2 2
	1 10

And the Surveyor employs none but the best of workmen.

III.—What is paid for teams?

	£. s. d.
For 3 horses and 1 cart	per day - 16 -
4 ditto and 2 carts	1 1 -

3. How many hours do they work?

Nine hours, inclusive of one hour for baiting.

IV.—What statute duty is performed upon the road?

A team of 3 horses, and one man to fill, for 4 parishes, 41 days.

Composition money, in lieu of statute duty, for 1 ditto, 12l.

The Surveyor observes, that if, on refusal or neglect to perform the statute duty, he should summon any person before the magistrate, a complaint is made of the badness of the highways, and the magistrate ordains the work to be performed on them. Thus is he deprived of even the small portion in his list. He is anxious to have the statute duty converted into money.

V.—How far are the general rules complied with?

1. Form:—In general the form is very good. In some places, as at Small Heath, the sides are rather low; these the Surveyor means to raise.

2. Drainage:—Much has been done to lay the road completely dry by under-draining, and also by digging out the side drains to a certain depth, and supplying unscreened gravel and siftings above in place of the clay. More remains to be done in both operations, particularly in draining the sides, which the Surveyor means to execute as soon as the funds admit.

3. Trees and fences:—Some large trees, which grew on the south side of the road at Elmdon, have been removed, by which the road is greatly benefited. A large one on that side, and a few on the other side, still overhang the road; and, as they never can be of more value than at present, there would be no loss to the owner in removing them. The young plantations there screen the road and do it injury. Some trees have been planted on the field side of the hedge, along Bichen Hill field, during spring 1822. The practice of planting hedge-rows on the sides of roads should in all cases be discontinued. They become great nuisances and augment the expenses of road repairing. The hedges are in general properly cut, but there is still a little to be done to complete this great improvement.

4. Materials, preparation of:—All the materials used on this road are properly cleaned before they are laid on. The breaking of the stones is now pretty good. Still more care is necessary, in breaking, to equalize the pieces, and have the largest of them of the prescribed

prescribed size, to go through a 2½-inch ring. The Surveyor is now sensible that good breaking is a great advantage, but thinks the material may be broken too small to bear the weight of heavily loaded carriages. Materials certainly may be broken too small, and stones may be so shivered in breaking as too easily to give way under heavy weights, but a stone to fit the aforesaid gauge can never be charged with this fault, provided the breaker is skilful, and takes proper care not to strike stones unnecessarily. The Surveyor found great difficulty in procuring good breakers, but now he has very good hands. The greatest part of them break with small hammers, in a sitting posture, and some of them on their knees.

5. Materials, disposition of:—The broken stones are used for the middle of the road. In a few instances the second gravel has lately been used, but this practice is to be given up as soon as a sufficiency for being broken is procured. Over nearly the whole of this district the bottom is clay, marly clay, and marle rock, all retentive of moisture. The Surveyor has dug out these on the sides of the metalled part to the depth of from 6 to 9 inches, and supplied their place with unscreened gravel, covered by screenings; by this operation, and draining wet places, the road has been substantially improved, as far as it is finished, and the remainder is to be completed, as soon as the means of doing it are obtained.

6. Management of labour:—Great part of the work is performed by contract, as above stated; and the Surveyor is most attentive to see that the works are performed well and with expedition.

STONEBRIDGE and DUNOCHURCH TRUST.—(SAMUEL ASTLEY, Surveyor.)

I.—Materials.

1. Gravel:

1. Geary's Heath Pit, parish of Great Packington, one quarter of a mile from the road.

Boring, digging and once screening	-	-	-	-	p' yd. 1	-
2d ditto	-	-	-	-	-	4½
Breaking	-	-	-	-	-	7½
						2
Carriage, 1 mile	-	-	-	-	-	1
						3
						p' yd.

½ side material. } Note:—This gravel is of excellent quality, and fully one-third
½ binding or foot-path. } of the screened heap may be used for the middle of the road.

The above prices for screening a first and second time are accounted by the same bulk.

2. Meriden Heath Pit, 1½ mile from the road.

Getting, screening and breaking,	as above, and value nearly the same	s. d.
Carriage, 1l. for 3½ yards	-	5
		7
		p' yd.

3. Allesley Meadows.

Digging and once screening	-	-	-	-	-	s. d.
						1 2
2d screening and breaking	-	-	-	-	-	1 9
						2 11
						p' yd.

Drawing, statute duty.

Note:—Quality very good, three-fourths of the heap fit for the middle part of the road.

4. Span End Pit, one quarter of a mile from the road.

Digging and once screening	-	-	-	-	-	s. d.
						1 3
2d screening and breaking	-	-	-	-	-	2
						3 3

Note:—Quality very good, and three-fourths middle materials.

Drawing 8 loads, or 10 yards, per day at 15s.

4 9 p' yd.

5. Underwood's mill, Witley Common.

Stone and gravel, chiefly used for lining the sides of the road.

Getting	-	-	-	-	-	s. d.
						9
Separating, sorting and breaking	-	-	-	-	-	2
Drawing 8 loads per day at 15s.	-	-	-	-	-	1 6
						4 3
						p' yd.

Note:—There may be a small quantity of good got in this pit, but the bulk of it is only fit for side material.

6. Witley pit.

Digging and once screening	-	-	-	-	-	s. d.
						3
2d screening	-	-	-	-	-	8
Breaking	-	-	-	-	-	1 2
Carriage, 8 loads or 10 yards for 15s.	-	-	-	-	-	1 6
						6 4
						p' yd.

Note:—This material is excellent, but owing to the thin, uncertain veins under deep cover, it is very difficult to procure; seven-twelfths may be used in the middle of the road.

7. }
8. } 1 pit at Bagington, and 3 at Ryton.
9. }
10. }

Digging, and once screening	-	-	-	-	-	-	s. d.
2d screening	-	-	-	-	-	-	9
Breaking	-	-	-	-	-	-	6
							6
							s. d.
							1 9
Carriage, average distance to those parts repaired with it	-	-	-	-	-	-	1 1

2 10 p' yd.

Note:—The materials got out of the above 4 pits are very weak and not more than one-fifth of the heap good middle material.

11. Woolaston parish pit; about 5 furlongs from the road at the Frog Inn, Stratton-upon-Dunsmoor.

Digging and once screening	-	-	-	-	-	-	s. d.
2d screening and breaking	-	-	-	-	-	-	9
							9
							s. d.
							1 6
Carriage, 6 loads, 7½ yards at 15s.	-	-	-	-	-	-	2 -
							3 6

Note:—One-third of this may be fit for the middle of the road, but as it contains a large quantity of flint stones it must be considered an inferior material.

12. Coston pit in the parish of Dunchurch.

Digging and once screening	-	-	-	-	-	-	s. d.
2d screening and breaking	-	-	-	-	-	-	1 -
							1 -
							s. d.
							2 -
Carriage, 5 loads per day, 6 yards at 15s.	-	-	-	-	-	-	2 6
							4 6

Note:—About five-twelfths fit for the middle of the road. Being composed of good pebbles and weak flint stones, it is an unequal material and not durable.

2. Field stones or pebbles:—Quality of those to the westward and about Coventry very good.

Picked and carried to the road at 2s. 6d. per ton, or at 23½ feet per ton	2	10½	p' yd.
Breaking	-	-	1 10
			4 8½

Quality of those above to Dunchurch.—The pebbles still very good, but a mixture of flint stones deteriorates the value of this material.

Picked and carried to the road, per ton of 23½ feet	2	9	-	3	1	per yard.
Breaking	-	-	-	-	-	1 4
						4 5

3. Quarry stones:—Rag stone is found attached to the sandstone in irregular strata of from 3 inches to 2 feet in the quarries near Pickford Brook and at Meriden Hill.

Quarrying the soft stone	-	-	-	-	-	-	s. d.
							1 -
— the rag	-	-	-	-	-	-	1 6
Breaking the rag	-	-	-	-	-	-	1 -
Carriage, average	-	-	-	-	-	-	2 -
							4 6

The Surveyor has used the soft stone for lining the sides of the road, but it is not sufficiently durable for the purpose.

The rag makes excellent side materials, and some of the best stands well in the middle of the road. While the sand is of a yellowish brown colour, the rag is grey with a slight blue tinge.

The soft costs	-	-	-	-	-	-	s. d.
							1 -
And is broken for the sides at	-	-	-	-	-	-	10 -
							1 10

II.—Contract work.

1. What part of the work is performed by contract?

Digging and screening gravel; picking and quarrying stones; carriage of materials; stocking the road; breaking the stones raised; shaping it by laying the materials equally and neatly over the surface. All the prices, excepting stocking, &c. are given above.

Stockings, and the process connected with it:

At Span End a trial was made at 6d. per lineal yard of 18 feet broad and found to be too little, say - - - - - 7d. p' lineal yard.

On the eastern side of Coventry - - - - - 6d. —

From Knightlow Hill to Dunchurch, including the laying, with the materials raised, about 1½ ton of new metal in every 8 yards in length - - 4d. p' lineal yard.

2. What part is performed by the day?

Some of the stones are broken by the day; scraping the road, laying on materials, clearing the side and other drains, are done by the day.

Five men have - - - - - 2s. -d. per day.

Twenty-six men have - - - - - 1s. 8d. —

When these can be spared from the road they are employed in getting gravel and stones.

III.—What is paid for teams?

Three horses and one cart is - - - - - -l. 15s. per day.

Four ditto and two ditto - - - - - 1l. —

Note:—These prices may be rated lower at present, the first 12s. and the last 16s. Four horses are used on Meriden Hill on account of its steepness.

3. How many hours a day do they work?

The general rule is 8 hours per day.

IV.—What quantity of statute duty is performed upon the road?

PARISHES.	Days Statute Duty.	Composition.
		£. s. d.
Packington - - - - -	30	4 14 -
Meriden - - - - -	34	4 4 11
Allesley - - - - -	30	12 - -
Coventry - - - - -	50	—
Willenhall - - - - -	36	1 10 -
Ryton - - - - -	42	1 1 -
Stratton-on-Dunsmoor - - - - -	42	2 13 3
Thurlaston - - - - -	75	7 - -
Dunchurch - - - - -	44	2 10 -
Days - - - - -	403	35 13 2

V.—How far are the general rules complied with?

1. Form:—The form of the road is in general good. In some places the sides require to be cleared out, and the middle raised by good hard metal; and in some instances the middle has too great convexity. Over the whole, however, the transverse surface is nearly level at equal distances from the centre, and has a neat appearance.

2. Drainage:—Very little more than has been done is necessary in this respect. If the road were raised a little opposite a pool near Lord Aylesford's gate, where the transverse surface inclines to the south, the proper shape might be given, and the road would be laid dry. The drainage of the road opposite Witley Hall, Lord Hood's, is also incomplete. Here an improvement of the road by cutting, embanking and sloping the sides sufficiently is necessary, when the complete drainage of it would be effected. The removing trees overhanging or overshadowing the road may also rank amongst the modes of draining it, by allowing the sun and air to exhale the moisture with rapidity. On Knightlow Hill, which also requires improving, some drains are necessary, for want of which the road seems to sink in some places, and run unequally. The street of Meriden should be raised out of the water on each side.

3. Trees and fences:—Some large oak trees have been cut and removed from the south bank of the road near Stonebridge, which has done it much good. Many more require to be taken away from the same side, all the way to the bottom of Meriden Heath. On entering the flat part in the village of Meriden, the road is at present very much injured by a thicket of trees on the south side. The evil will increase yearly by the rapid growth of so thriving trees. Much good would be done to the road by thinning them, lopping the branches and removing those at present too near it.

From Pickford Brook to a pool on the south of the road, many large trees, of full value at present, very much injure the road. On both sides of Allesley, and passing the avenue to Allesley Park, the same observation applies. On the east of Coventry, in approaching the common, close rows of large trees on each side of the road, particularly those on the south side, which grow on a high bank, do very much injury, and incur very great additional outlay from the repair funds of the road. In passing Lord Hood's park, bushes and some small trees have been removed this season, in consequence of intimation from the Trustees, on the recommendation of the Parliamentary Commissioners; but the great evil of young, thriving trees too near the road, old large trees growing on high banks on the south side, and the banks themselves, almost perpendicular, still remains, so that this portion of road is much in want of improvement. Opposite Willenhall some trees are too near the road; and

and the long avenue of trees from Knightlow Hill to the bottom of Dunchurch Sands, of which notice has been taken in every Report upon the road, occasion a much greater outlay than would otherwise be necessary.

A considerable extent of hedges have been cut in obedience to the said intimation recommended by the Parliamentary Commissioners, but this has not been so general as it ought, so that those remaining should be cut at the beginning of the ensuing season.

4. Materials, preparation of:—Very much improvement has been made in this branch of road repairing. In some parts of this Trust the stones are very perfectly broken; and the Surveyor, by persisting in what he appears most anxiously to aim at, will soon be able to get all his labourers trained to his wish. The cleaning of the materials is very properly attended to, and a good stock has been provided.

5. Materials, disposition of:—Much pains have been taken in the application of the materials of hard and durable kinds to the middle part of the road, and to lay the sides with the inferior kinds, by which means this district has been rapidly improved. The road over Meriden Sands, formerly worse for horses than Meriden Hill, has a portion in the middle hard and sound, though yet too narrow, and even weaker than it should be. From Pickford Brook to Coventry, the proper application of well prepared materials has rendered that part, formerly a very heavy road for carriages, sound and good. The same observation may be made of the road all the way to Willenhall. From this to Knightlow Hill, the proper disposition of the best part of very small materials, many of inferior quality, to the middle part, has so far corrected the deep sandy surface as to render it comparatively firm and good. Still, however, all the attention the Surveyor can give will be necessary to secure and improve the advantage already gained, by a constant application of selected good materials.

From Knightlow Hill to Dunchurch, the middle portion of road has been very much improved in the same way.

6. Management of labour:—The plan pursued of stocking the road, and the other operations in connection, by the yard, has greatly contributed to the rapid improvement made, particularly on the parts from Stratton to Dunchurch. This plan is intended to be continued, and will have the best effects. All the labourers now employed seem to be qualified to execute their work, and are gradually improving and becoming masters of the different operations. At Span End some stocking was done by the day. The men complained of having too little at 6d. per lineal yard, and some of the Commissioners advised the Surveyor to give day wages.

DUNCHURCH and STRATFORD TRUST.

(JOHN URTON, Surveyor.)

L.—Materials.

1. Gravel:

1. Dunchurch Pits; quality very weak; not more than one-fifth of the heap is breakable, and much of that is sandstone and weak flints. The best is of the quality and colour of Hartshill stone.

Digging and once screening	s. d.
1 6 p' yard.	
2d ditto and breaking	8 —
	2 2

2. Willoughby Pits.

Digging and washing once, inclusive of damages or payment	s. d.
for the surface	2 6 p' yard.
2d screening and breaking	1 —
	3 6

When washed and prepared as above, the half of it is now used for the middle of the road, but this proportion makes a very inferior material, owing to the quantity of small left in it. Not more than one-third can be calculated upon as proper for the middle part, and the remainder for the sides. Quality:—Good Hartshill pebbles, some limestone, in form of shells, flints of better sorts, and a very little sandstone.

Mr. Gurdon dug gravel in a field on the south side of Oxford Canal, opposite the house of Mr. Lees, and said, as far as he recollected, the gravel was of good quality and worth attention.

3. Bramston Pit.

Digging and once screening	s. d.
1 8	
2d screening, sorting and breaking	1 —
	2 8 p'yd.

Quality:—Flints, limestone, pebbles of different kinds, and a little sandstone. The greatest proportion being limestone of an inferior sort, and a small proportion of good pebbles, it is unfit for the middle of the road, but would make good sides. Some large masses of stone, composed of flints, a better kind of limestone of different colours, with a kind of granite, such as Hartshill stone, are got out of this pit; the best of these may be used for the middle of the road.

4. Daventry Pit.									<i>s. d.</i>
Digging and once screening	-	-	-	-	-	-	-	-	1 8
2d screening, sorting and breaking	-	-	-	-	-	-	-	-	6

Quality:—Flints, some pebbles, and a considerable quantity of sandstone. This material is only fit for the sides of the road; very little of it being sufficiently hard for the middle.

5. Dodford gravel.									<i>s. d.</i>
Getting and once screening	-	-	-	-	-	-	-	-	10 ½
2d screening, sorting and breaking	-	-	-	-	-	-	-	-	8

Quality:—Flints, Hartshill pebbles, some limestone, and petrified shells. About one-half of this gravel has been used for the middle of the road, but as it has been proved and found deficient, perhaps one-fourth may be calculated upon as decent centre material, and by drawing a less proportion from the pit, a good side material may be formed. This gravel is imbedded in sand.

6. Weedon Pit.									<i>s. d.</i>
Digging and once screening	-	-	-	-	-	-	-	-	1 1
2d screening, sorting and breaking	-	-	-	-	-	-	-	-	8

The quality of this pit is nearly the same as that of Dodford Pit. It contains a greater proportion of Hartshill pebble, and is, on that account, a better material. Half of the heap has been applied to the centre, from necessity, but in the course of improving, the one-third or perhaps one-fourth only, may be estimated as a fair proportion. In this case much, now drawn to the road, must be left in the pits; and considering the trifling expense of procuring and breaking now paid, a proper addition of price would be well bestowed, so as to compensate the workmen. Supposing half only of what is now carried to be used, the price might be augmented to 3*s.* or even doubled; 3*s.* 6*d.* for good middle and side metal. The carriage is the same, and the value would be at least tripled. This gravel is imbedded in a clayey substance.

7. Hayford Pit.									<i>s. d.</i>
Digging and once screening	-	-	-	-	-	-	-	-	1 1
2d screening, sorting and breaking	-	-	-	-	-	-	-	-	8

Quality:—Flints, pebbles and some hurlock, or chalk stones in the form of pebbles. Half of this has been used for the middle of the road, to which the same observations apply as to Weedon gravel; the gravel is imbedded in sand and is a weaker material than Weedon.

2. Field stones or pebbles:									<i>s. d.</i>
Picking	-	-	-	-	-	-	-	-	2 6 p' ton.
Braking	-	-	-	-	-	-	-	-	1 8
									<i>s. d.</i>
At 23 ½ feet p' ton	-	-	-	-	-	-	-	-	4 2 - or - 5 4 ½ p' yd.
Drawing for 1 ¼ mile	-	-	-	-	-	-	-	-	1 3 - - - 1 5

Chiefly Hartshill quality, but very few are to be procured in this Trust.

3. Quarry stone:

1. Sandstone for bottoming. Quarrying 6*d.* to 9*d.* average per yard 7 ½*d.* commences on Drayton Hill, opposite toll-gate, and continues upwards to Dodford. In procuring bottoming for the new road at Drayton gate, beds of light blue, sparkling stone have been found, called in the district rag stone. It is very hard in appearance, but from trials made of similar stone in the workable parts of the road in the neighbourhood, it appears to be fit only for the sides, and for this purpose it is a very good material.

Newnham pits:

Sandstone	-	-	-	-	-	-	-	-	3 ½ feet.
Blue-grey rag	-	-	-	-	-	-	-	-	1 ½
									5 feet. <i>s. d.</i>
Quarrying	-	-	-	-	-	-	-	-	9
Breaking	-	-	-	-	-	-	-	-	1 3

Excellent bottoming and side metal. The sandstone might be used for filling the side drains, to the depth of from 9 inches to a foot, but ought not to be brought to the surface; a covering of gravel ought to be laid over it.

2. Stow Hills:—Limestone is wrought and burnt into lime at Dirthouse, but there is very little appearance of good hard road metal in the pits, and none is now procured there, though it is to be hoped that in making the improved line of road, some good will be discovered.

[illegible][illegible]

Cover	- - - - -		20 ft.			s.	d.
Soft limestone, whitish	- - - - -	4}	6	- Quarrying	- - - - -	2	-
Good - ditto - blueish	- - - - -	2}		- Breaking	- - - - -	1	-
			26				

[illegible]

Cover, from 1 to 4 ft. -	-	-	2 1/2 ft.				
Limestone, all good, from	3		average.				
to 7 ft. -	-	-	5 ft.	-	Quarrying	-	-
					Breaking	-	-
			7 1/2				

Cover	-	-	-	4 ft.			s. d.
All good limestone, 1 to 1½ - average	1½	-	Quarrying	-	-	-	1 4
			Breaking	-	-	-	1 -
	5½						

[illegible]

Cover	-	-	-	about 6 ft.			
Rock, soft	-	-	-	4	} 7	-	Quarrying Breaking
Ditto, good	-	-	-	3			
				13			

Cover	- - - about 3 ft.			s.	d.
Rock limestone, nearly of one quality,	5	Quarrying	- - -	8½	
	<u>8</u>	Breaking	- - -	1	

Cover	- - -	- about 3 ft.					
Rock, soft	- - -	2½}	5	Quarrying	- - -	s. d.	10
Ditto, harder	- - -	2½}		Breaking	- - -		1
			8				

Cover	-	-	-	-	about 4 ft.		
Rock, pendle and bottom-stone,							
very good	-	-	-	3		Quarrying	s. d.
Useful for sides	-	-	-	2	5	Breaking	10
					9		1

III.—What is paid for teams?

Almost altogether by task.

						s.	d.
For the first remove, not exceeding a quarter of a mile	-	-	-	-	-	6	p' yd.
- - - Ditto - - half a mile	-	-	-	-	-	8	—
- - - Ditto - - three quarters of a mile	-	-	-	-	-	11	—
- - - Ditto - - 1 mile	-	-	-	-	-	1	1½ —

and so on, at the rate of 2½ d. for every quarter of a mile, or 10 d. per mile of increased distance.

The Surveyor thinks the above rates may be a little reduced, owing to the cheapness of provisions.

1. How many hours a day do they work?

Statute duty teams work 8 hours per day.

IV.—What quantity of statute duty is performed upon the road?

By 54 Geo. III, anno 1814, the magistrates are empowered to convert the statute duty into money, upon the Surveyor's showing that more work can be obtained for the money than by payment in kind.

The Trustees are now engaged in bringing this measure into operation, but the rates for the whole of the Trust are not yet fixed; the Surveyor estimates them at the average of 9s. 4 d. per day of a team, and the number of days at 970½, amounting to - 452 l. 18s.

He has never been able to obtain the composition money for the rents, exceeding the drafts of 50 l. each, from the occupiers of land in the parishes.

Owing to the variation in the rents the number of days and composition money are constantly varying, and a new list is to be made every year.

V.—How far are the general rules complied with?

1. Form :—The Surveyor has procured road-levels for shaping his work, with which he makes specimens, and causes the men to follow them in taking out the sides.

Formerly the gravelled part of the Trust was repaired out of the pits in the country, laid on unbroken, and in a very dirty state; the middle was made hollow for the purpose of washing it in rains, and where a stream of water could be turned upon it. Now, great exertions are making to raise the middle and lower the sides to the transverse elliptical surface prescribed. Much has already been done, both on the gravel and limestone district; and the work, which is now in hand, will be completed as speedily as possible; but a considerable time must elapse before the shape, after being made, can be kept perfect, owing to the want of proper materials.

2. Drainage :—The drainage of springs appears to be completed, but incessant care is necessary to carry off the water from the whole road and side-drains, by proper outlets. Wherever the sides are clay, and liable to be poached by cattle, drains of proper depth, from 6 to 10 inches should be cut, filled with stone and covered with gravel, and from which cuts should be made into lower ground.

3. Trees and fences :—Over a great extent of this Trust hedge-row and other trees do very much injury to the road. From Dunchurch to the end of the avenue which commences at Knightlow Hill, the greatest part of the road is completely shaded by two close rows of large trees. Opposite the parsonage at Willoughby, and along the sides of the road to near the canal, hedge-row and other trees are far too numerous. From Drayton toll-gate to Windmill Inn, a very close row of large hedge-row trees shade the road; also on the south side near to Daventry. In passing Newnham ground both sides of the road are thick set with hedge-row trees, which do much mischief, particularly the south row; and the north row continues to Dodford. In passing the military ground at Weedon there is a high, very thick plantation, a rapidly growing incumbrance. Along Church Stow Hill a close hedge-row, growing on a high bank, should be totally removed. On the eastern side of Foster's Booth Hill a young plantation, on the south of the road, is fast rising to overshadow it. From Foster's Booth to past the Rose Inn, and from a little below Duncote Lane to Towcester Bridge, the hedge-rows on the south side are a very great nuisance; a young fir, &c. belt of trees on the north side of the road, by preventing a thorough current of air, does much harm. Some young trees have been put in on the south side of the road at the western end of Towcester; opposite Heathcote large trees are growing on the south side too near the road. Many of the large trees on the south side of the new road, to the eastward of Cattle Mill, which were to have been taken down, still remain. After passing Potterspury, a hedge-row on a high bank, south of the road, should be removed; many grow in the north hedge also.

The hedges over the greatest part of the Trust have been cut this year, since intimation was given at the request of the Parliamentary Commissioners; what still remain to be cut must be attended to early in next season, for which intimation should be repeated.

4. Materials, preparation of :—This essential branch of road repairing has been duly performed, as far as circumstances would permit; the great has been separated from the small, and properly broken; the small has been made as free from earth, sand and clay as repeated screenings could make it. The best rock in the different pits has been separated and broken by itself, and the inferior kinds by themselves. The stones picked up out of the road have been broken small before being relaid; but still the mixture of very inferior metal amongst the good remains, which can only be separated by hand, and which may hereafter be thought advisable. The breaking of the stones is not, generally, so perfect as could be wished,

wished, owing to the want of skill and experience in the workmen, which time alone can correct.

5. Materials, disposition of :—Much care is now bestowed in strengthening the middle of the road by the most durable materials, and, as far as possible, extending the middle part; some side materials have also been laid on, and the road thereby made nearly perfect. This has been done only to a limited part for want of materials, or means of procuring and applying them to the necessary extent; although the greatest part of the road is still in a very imperfect state, and must remain so till the middle can be fully coated, either with foreign stone or with the best which can be procured from the fields or pits in the district, and also the sides close up to the side drains made good with stone or gravel, of sufficient durability; yet by constantly persisting in raising and strengthening the middle, by drillings and partial coatings, keeping the side drains clear, and the sides as well-shaped and smooth as possible, the condition of it must be gradually made better.

6. Management of labour :—The greatest part of the labour is done by contract; and where it cannot be set the labourers are under the direction of steady men, in each district, who are accountable to the Surveyor for the quantity performed and proper execution of the work.

At first I had frequent occasion to remark to the Surveyor, by himself, and in presence of the men, the dilatory manner in which the work was performed even by contract.

STRATFORD and HOCKLIFFE TRUST.—(WILLIAM SALTER, Surveyor.)

1st Division, to Brickhill Church.

1.—Materials, consisting of gravel and limestone.

1. Gravel :—A little may now and then be got at Stratford, but not in pits.

1. Pit :—A mile to the eastward of Shenley, on the south side, and about a quarter of a mile from the road.

The quality of different kinds; some reddish Hartshill, a few blue, similar to Scots whin, grey granite, a few flints, and others of intermediate qualities.

After it has been well-riddled twice, half of the heap may be broken and used for the middle of the road.

	s.	d.
Digging and twice riddling - - - - -	2	- p' yd.
Separating and breaking the large - - - - -	1	8
Carting one mile, inclusive of filling - - - - -	1	4.

5 -

2. Pit, Fenny Stratford :—Formerly a small inferior kind was got at Fenny Stratford, but now better has been discovered, which may be rated nearly equal to Shenley.

	s.	d.
Digging and twice screening - - - - -	1	6 p' yd.
Separating the large by a rake and breaking it - - - - -	1	8

The first may be divided thus - - - - -	{ small	- - - - -	1 - p' yd.
	{ large	- - - - -	3 - d°

The second - - - - -	{ small	- - - - -	- 9 p' yd.
	{ large	- - - - -	2 3 d°

To the first large, add breaking 1 s. 8 d. makes it - - - - - 4 8 d°

To the second - - - - - 1 s. 8 d. - - - - - 3 8 d°

2. Field stones or pebbles :—About Denbigh Hall a few field stones may, occasionally, be picked up, but so few as not to be worth reckoning upon.

	s.	d.
Picking per load of, say 1 ½ yard, 1 s. 8 d. - - - - -	1	4
Breaking - - - - -	1	6
	2	10 p' yd.

A few may also be got about Little Brickhill, and cost ;

	s.	d.
Picking per load, as above, 1 s. 8 d. - - - - -	1	4
Breaking - - - - -	1	-
	2	4

3. Quarry Stones.

1. Wolverton or Galley Hill Pit, about 100 yards from the road near Stoney Stratford.

Cover - - - - - 4 to 6 - - 5 feet average. - - - - - s. d.

Limestone rock, all good - 4 to 6 - - 5 - - d° - - Quarrying - - - - - 9 p' yd.

2. Bradwell Abbey Pit, about one mile from the road.

Cover - - - - - 1 foot or thereabouts.

Limestone rock - about 3 d°, all very good. - - Quarrying - - - - - 6 p' yd.

Carting to road - - - - - 1 6 d°

3. Loughton

3. Loughton Pit, about one mile from the road.

Cover	-	-	-	7 to 8	-	-	7½ feet average.	
Limestone rock	-	-	-	6	d°;	pretty good	} Quarrying	-
blue stone, but inferior to Bradwell Loughton	-	-	-					-

4. Loughton New Pit, about three quarters of a mile from the road.

Cover	-	-	-	3 to 4	-	-	3½ feet average.	
Limestone rock	-	-	-	-	-	-	3, superior quality.	- Quarrying

5. Little Brickhill stone, at various distances from the road; nearest, half a furlong; further, three quarters of a mile or thereabouts.

This is sandstone composition, impregnated with iron, and is hard and of a purple colour. It is found in what may be termed basons, or pits of different capacities, which, on account of so many new openings, renders the procuring expensive. It lies in these pits in pretty parallel beds, nearly horizontal, of from half an inch to five inches thick. When properly selected and broken, it may last for about six months upon the middle of the road. This shows that no part of it is fit for the middle of the road, and that it ought to be used for the sides only, and properly covered with gravel.

The new road at Brickhill has been bottomed with it, and also what has been done at Hockliffe, for the remainder of which a great quantity has been got. For Hockliffe it has been procured near to Woburn and on Leighton Buzzard Heath; much of it is to carry nearly five miles.

Getting and stocking, from 1 s. to 1 s. 3 d.	-	-	-	average	-	1 1½ p' yd.
Breaking, about	-	-	-	-	-	6 d°.

In workings about Brickhill, Mr. Salter has found a kind of gravel composed of flint stones, a few pebble stones of Hartshill, and other qualities, and some chalky substances, of which he has procured about 150 yards. He means to clean it well and make a trial of its value.

Digging and cleaning twice	-	-	-	-	-	1 s. 6 d. p' yd.
Breaking, the large	-	-	-	-	-	6 d°.

II.—What part of the work is performed by contract and what by the day; what are the contract prices and wages?

1. By contract:—Procuring, screening and breaking; quarrying stone, and all carriages, also stocking the road, shaping and relaying it.

The procuring, screening, &c. are estimated above.

Stocking from 12 to 15 feet wide, is done from 4 d. to 6 d. or 5 d. p' lin. yard.

This includes, raising, breaking, shaping and relaying, also adding some new materials.

Quarry limestones are broken at - - - - - 1 s. p' cub. yd.

Shaping the sides to the width of 30 feet is done for from

3 d. to 6 d. per pole of 5½ yards for each side, or for both } 1½ d. p' lin. yd.

sides from 6 d. to 1 s. - - - - - average 9 d. }

What by the day?

Laying on the materials, scraping, filling waste, drilling ruts, filling hollows, and smoothing the road; also letting off water.

Wages, from 1 s. 6 d. to 1 s. 8 d. - - - - - or 1 s. 7 d. per day.

III.—What is paid for teams? How many hours a day do they work?

A team of four horses, 3 drawing in one cart, one in a second cart, } 18 s. p' day.

filling, with a driver and filler, costs - - - - - }

And they work eight hours per day.

IV.—What quantity of statute duty is performed upon the road?

In the parish of	Days.
Wolverton	130
Colverton	100
Bradwell Abbey	30
Shenley Church End	58
Loughton	74
Shenley Brook End	60
Simpson	64
Fenny Stratford	67
Bow Brickhill	70
Little Brickhill	36

Total - - - 689

No composition money for sums above the drafts has ever been received by the Holyhead road Surveyor.

V.—How far are the general rules complied with?

1. Form:—Formerly the gravelled part of the road was washed with water in rains and in places where a stream could be obtained. Now the middle is raised, as much as possible, out of the reach of water, and every effort used, by giving and keeping the convex shape, and also smoothness of surface, to discharge the water from it as it falls; and this very important improvement has been effected in a great degree. The sides have also been taken out, and a proper shape given to them. Still, owing to the total want of materials, the sides cannot be kept in the right shape. The Surveyor should endeavour, as soon as possible, to cure this great defect in his road, by procuring materials, and laying the sides of sufficient strength to the extremities of the 30 feet.

2. Drainage:—This has been accomplished, as far as regards springs. Wherever the ground is flat and water appears in the sides, drains of from 6 to 10 inches in depth should be made, filled with stones, and the stones covered with gravel; and outlets from these into lower ground should be made. In several places streams of water run upon the sides, which the Surveyor takes care to keep open and clear.

3. Trees and fences:—From a little to the eastward of Two-mile Ash toll-gate, through the village of Shenley, hedge-row trees and young belts of planting, in a very thriving state, line the south side of the road; and near to Shenley both sides are lined with them. From Shenley to the brook and through the valley, the south side of the road is thick-set with trees in the hedges, and some on the bank next the road. These trees, for a considerable distance, stand on a bank raised above the road. After passing Denbigh Inn, a plantation has lately been made on the south side of the road, and from the bottom of the descent, approaching Penny Stratford, some large hedge-row trees line the road on each side.

A considerable extent of the hedges have been cut since the intimations were given last season. Some remain uncut, which ought to be done early next season.

4. Materials, preparation of:—The gravel has been well screened, and the large separated from it, and all the stones, of every description, have been properly broken.

5. Materials, disposition of:—Very much attention has been given to this important branch; the best materials have been laid on the middle of the road, and into the ruts and hollow places, with uncommon neatness; and the surface has been, in general, kept very smooth. The centre part is gradually widening, and the sides have, in some places, been coated to near the side drains, and the appearance of the road is now very respectable.

6. Management of labour:—At first the Surveyor found great difficulty in getting the stones perfectly broken by the yard, and resolving to have this accomplished, employed careful hands by the day, in order to train them. Now that his object has been gained, he lets the breaking; and his men, having overcome their prejudices, and acquired skill, are willing to undertake the work. The labour of this Trust has also been conducted with energy.

STRATFORD and HOCKLIFFE TRUST.—(RICHARD REDBALL, Surveyor.)

2d Division, from Brickhill Church to Hockliffe.

I.—Materials:

1. Gravel.

1. Bome's Waste or Common, between 2 and 3, or nearly 3 miles from the road. The quality various: some very good pebbles of the different kinds of granite and grit stone, but the greatest proportion flints, many of which are so tender as to be pounded into dust by the first wheel. Much of this is coated with chalky substances, which gives the heap a white appearance. After the large has been separated, not more than a half of it can be reckoned good for the centre portion, and the separation of the good can be made in no way but by hand.

	s.	d.
Digging and once screening	1	6 p' yd.
2d screening and separating the large	—	—
Broken for	1	—
Carriage to road	2	—

2. Heath and Reach Meadow, near a small brook about three quarters of a mile below Sandhouse, to which the road is very bad, so that it is carried with difficulty to the side of the turnpike. This gravel is much better than the above, but still by far too many flints of inferior quality in it reduce the quantity procured to a small bulk of good centre metal.

	s.	d.
Digging, once screening and washing	2	— p' yd.
Breaking	1	3
Carriage to hill top to the westward of Sandhouse	1	6

3. Hockliffe Meadows:—The gravel got in these meadows, after being properly screened and washed, as is now doing by Mr. Baylis for the new road, and also by the Surveyors, produces a very considerable portion of very good metal; but the flints and sandstone in it forming a large part, which cannot without hand picking be separated from it, diminish its value. Still it is more lasting than any flints which are brought to the road from Dunstable Hills.

	s.	d.
Digging, once screening and washing	2	— p' yd.
Breaking	1	3
Carriage, the average distance	1	6
Reckoning from one-third to one-half of the heap breakable or fit for the middle, the small may be worth	1	—
And the large	5	6
And binding	—	6

2. Field stones or pebbles are got on Heath and Reach Common; quality good, in general, but inferior kinds mixed. Only a few can be got.

	s.	d.		s.	d.
Picking 20 bushels, or 25 $\frac{1}{4}$ cubic feet	2	6	— or —	2	8 p' yd.
Breaking	1	3	—	—	—
Carriage	2	—	—	2	1 $\frac{1}{2}$

At

Picked at	-	-	-	-	-	-	2	-
Broken	-	-	-	-	-	-	1	-
Carriage	-	-	-	-	-	-	-	9

3 9 - Say - - 4 s. 3 d.

II.—Contract Work.

1. Procuring, preparing and carrying materials, to which the prices are affixed above.
2. Stocking the road 18 feet wide, and average 3 inches in depth, including breaking, shaping and relaying, from 3d. to 9d. per yard lineal.

The high price of 9d. was paid for the hollow near Sandhouse where large stones were to raise the average may be 3d.

The bulk of the materials being soft, much puddle is produced; and scraping the puddle, removing it, filling hollows, drilling ruts, and other surface work, to keep it dry and as smooth as possible, occupy them fully. Wages 10s. per week.

All contract work, and the general rule for them, and for statute duty teams, is 8 hours per day.

Little Brickhill parish does	-	-	-	-	-	25 days.
And in lieu of composition money	-	-	-	-	-	0
Great Brickhill	-	-	-	-	-	50
Soulsbury, none at present.	-	-	-	-	-	
Heath and Reach	-	-	-	-	46	} 62
And in lieu of composition	-	-	-	-	16	
Hockliffe	-	-	-	-	-	36
Battlesdon	-	-	-	-	-	46

No composition money has ever been collected, the farmers choosing to pay in kind.

1. Form:—Formerly, not knowing how to manage so perishable a material, as the bad stone about Brickhill, and the imperfectly prepared gravel then applied to the road, the Surveyor, by desire of the Trustees, raised the middle to a dangerous height in many places, with a narrow convex top, by which the carriages were confined to the centre, and it was completely cut to pieces. He had also taken out the sides to an unnecessary breadth and depth by a pretty regular curving line. Now, by the road-level, he is endeavouring to correct this, as fast as money and well-prepared materials can be obtained, and has already accomplished a considerable part.

3. Trees and fences:—The belts of young planting on each side of the lodge, south of the road, on the approach to Great Brickhill, are fast growing incumbrances. The sloping of the sides of the improvement over Hockliffe Hills will remove most of the trees, and give great relief to the surface on the summits, now sunk so low.

4. Materials, preparation of:—The improved state of this department merits commendation; and the principal objects now are, great care in selecting the good middle and side materials at the pit, and carrying them only; and in separating, as far as possible, even by hand, the very inferior qualities from the good, and using them as side materials.

The mode of applying the materials upon the new improvement of Hockliffe Hills is an excellent pattern for the Surveyor upon this Division.

6. Management of labour :—The labourers upon this Trust are very willing and ready to do what they are desired, and in this they are encouraged and instructed by the Surveyor; so that, in future, by selecting and applying more perfect materials much improvement may be expected.

HOCKLIFFE and DUNSTABLE, or PUDDLE HILL TRUST.—(HARDIE, Surveyor.)

I.—Materials.

1. Gravel.

1. Hockliffe:—The quality has been described in the last Trust. It is composed of flints of different colours, white, black, reddish mixture, and yellow; the worst, the white and yellow, are most numerous; some pebbles of Hartsbill and a few blue resembling whin. A considerable quantity of sandstone pebbles, white, grey and yellow; some of them very hard and good, others principally of the yellow colour, very inferior; it is procured all round Hockliffe, in the valley. The beds are not regular, the cover varying from $1\frac{1}{2}$ to 4 feet, and the depth of bed from 1 to 4 or even 5 feet. Some large stones are dug out, mostly of the sandstone qualities; it lies on sand and clayey substances.

Digging, screening, washing and separating the large by a rake and different sized riddles - - - - - 2 s. p' yard.

Breaking the large stones at 1 s. per load of from 24 to 28 cwt. or say 1 s. 2 d. p' yard.

Note:—If all the stones were to be broken the price would not be less than 1 s. 6 d. to 1 s. 8 d. per yard.

Carriage - - - - - 9 d. p' yard.

The above are the prices given for the Woburn and parish road materials.

2. Toddington parish gravel.

This gravel is very different in the different pits. The best of it has more large in it than Hockliffe gravel; and if none but the best middle and side materials were carried to the road, the repairs made by it would be the most perfect and durable.

Digging, screening through a 19-inch riddle of 56 spaces, raking out the large with a proper sized rake, and resifting out the waste after the heap has lain and become dry - - - - - 1 6 p' yard.

To this a sufficiency ought to be added for preparing it more perfectly.

Damages to land - - - - - 3 4 - -

Breaking - - - - - 1 2 - -

Carriage, $3\frac{1}{2}$ miles - - - - - 2 6 - -

Cost of the whole bulk laid upon the road - - - - - 5 5 4

Supposing the half carried to the road, upon a more perfect system of preparation, to be good centre material, 1 s. 10 d. or 2 s. might be the price necessary to be given in place of 1 s. 6 d. the half for the sides might be estimated at - - - - - 1 4 p' yard.

Adding for damages, say - - - - - 3 4 - -

- - - - - s. d. 1 7 4

And the good would be preparing - - - - - 2 8 - -

Breaking - - - - - 1 2 - -

Damages - - - - - 2 4 - -

- - - - - 4 - 4

The carriage of both is the same; but more ought to be given for breaking the middle part, after it has been properly cleared of the small and weak parts, say 1 s. 8 d. or raising the good to 4 s. 7 4 d.

3. Dunstable Hill:—Here flint gravel can be got in small quantities, and costs,

Digging and twice screening - - - - - 1 6 p' yard.

Third screening - - - - - 3 - -

Damages - - - - - 3 - -

- - - - - 2 - -

Carriage, about 4 miles - - - - - 4 6

This gravel is altogether flint, and good for nothing but the sides of the road, and for which it is too expensive.

2. Field stones or pebbles:—The only field pebbles to be got are about and beyond Toddington. The Surveyor has procured 30 loads from the parish of Westoning, mostly pebbles of good quality mixed with a few flints.

Cost on the field - - - - - 2 s. p' yard.

Drawing 1 yard from Toddington, being $\frac{1}{4}$ miles, and 1 yard from Westoning, being 5 miles, costs - - - - - 5 s. p' yard.

From Westoning alone the yard could not be carried for less, owing to the steepness of the road beyond Toddington, than - - - - - 7 s. 6 d. p' yard.

Field flint stones are got from the fields in the parishes of Sudham, Whipsnade and Dagnell, lying to the southward, and from 4 to 5 miles from Dunstable. The greatest proportion of these flints are very brittle, and soon grind into dust; even the best of them are easily broken into small pieces of shapes very unfit to bear heavy weights without being crushed to pieces.

Picking up from 1 s. 6 d. to 1 s. 8 d. per yard; and with damages to - - - - - s. d.

crops, &c. cost - - - - - 2 6 p' yd.

Carriage by 3 horses - - - - - 5 - -

Breaking - - - - - 9 - -

- - - - - 8 3

3. Quarry

3. Quarry stones :—Flint stones are dug out of pits on Studham Downs to the southward, and about 3 miles from Dunstable; they are imbedded in reddish clay to the depth of from 9 to 18 feet. As much of the clay as possible is left in the pits, and the flints are spread on a piece of ground in thin layers till the clay dries, when they are tossed about by a small two-pronged dung fork till the clay is completely beat off.

Digging and cleaning	-	-	-	-	-	-	-	-	-	s. d.
Carriage by 2 horses, which go one day twice in the day, and one day only once alternately, to the average of the road between Dunstable and Hockliffe gate	-	-	-	-	-	-	-	-	-	2 - p' yard.
Breaking 1 s. laying on 1 d.	-	-	-	-	-	-	-	-	-	5 -
										1 1 -
										8 1

These flints seem to be of stronger quality, and bear heavy weights better than field flints.

II.—What part of the work is performed by contract, and what are the prices of contract work?

1. All the materials are procured, cleansed, carried and broken by contract, and the prices are given above.

2. Wheeling stones to drill ruts and equalize the surface - - - 3d.
Spreading - - - - - 1 d. — 4 d. p' c. yd.

3.—Raising the middle 18 feet to the depth of from 3 to 4 inches, raking the surface into the right shape, spreading the good materials equally over it, breaking the large stones raised to the right size, and sowing them regularly upon the middle portion, 6d. per pole of 5½ yards, or - - - - - 1 d. per lineal yd.

4. Scraping 30 feet wide from 1½ d. to 2 d. according to circumstances, by the pole of 5½ yards.

What part of the work is performed by the day, and what are the wages given?

Almost all the surface work, such as scraping, drilling ruts and filling hollows, clearing the side drains and water outlets.

The wages are 1 s. 6d. per day - - - - - 9 s. per week.

III.—What is paid for teams?

For 2 carts and 3 horses, 2 horses constantly drawing - - - 10 s. per day.

How many hours a day do they work?

The regular time in the yoke is 8 hours per day, and this is also the rule for the statute duty.

The Surveyor has paid for carrying chalk from the top of Chalk Hill to fill up at the bottom of the embankment, 5d. per load, 1½ yard, or - - - - - 4d. per cubic yd.

Also for filling Hockliffe-street, from 4½ d. to 1 s. according to distance, for a load which he estimates 1½ yard, average 9d. or - - - - - 7½ d. per cubic yd.

IV.—What statute duty is performed upon the road?

The assessment upon land is, 6 days of a team for - - - - - 50 l. rent.

— 12 days of a team for - - - - - 100 l. —

— 18 days of a team for - - - - - 150 l. —

and for every additional 50 l. in proportion. They are termed drafts; 50 l. is one draft, 100 l. is two, &c. &c. When the rent is lower than one draft, composition money at the rate of 1 s. 6d. per pound is paid; and for sums exceeding the regular drafts, composition money at the same rate is paid; so that for 70 l. rent, 6 days of a team, and 1 l. 10 s. for composition money is payable.

Note :—If a farmer keep horses, though his rent should not amount to 50 l. he is chargeable with 6 days statute duty.

The allotment for the mail road in the different parishes is at present one-third of the whole statute duty.

		Days to Mail road.
For the parish of Chalgrave the duty is	-	56
For - ditto - Tilsworth	-	28
For - ditto - Houghton	-	64
For - ditto - Hockliffe	-	10

Total allotted for the mail road - - - 158

For the highways twice as much - - - 316

158 days for mail road at 10 s.	-	-	-	-	-	474	£. s. d.
Composition for ditto, Chalgrave parish	-	-	-	-	-	79	-
— Tilsworth ditto	-	-	-	-	-	3 6 1½	-
— Houghton ditto	-	-	-	-	-	18 9 4½	-
— Dunstable quota, paid by award of the Trustees	-	-	-	-	-	4 - -	-
— Hockliffe ditto	-	-	-	-	-	1 8 -	-
						37 15 6	-
						£. 116 15 6	-

V.—How far are the general rules complied with?

1. **Form**:—The form of the road has been very much improved since the latter end of the year 1820; the sides have been raised where the middle was too high and narrow, and the breadth defined by side drains. Still much remains undone; and, owing to the dirty state of the materials formerly laid on, and the mixed, imperfect quality of those now used, the right shape cannot long remain till better materials for both the middle and sides can be got.

2. **Drainage**:—Trunks and cross drains have been put in where necessary, and the brook, which used to run down Hockliffe-street, is now embanked by the improvement in raising the road, and carried across the fields and Leighton Buzzard Road into Hockliffe Brook. The sides of the space next the hedges require to be raised and smoothed, to prevent water from standing in them.

3. **Trees and fences**:—A few trees near Hockliffe toll-gate, growing on a bank too near the road, on the south side, should be removed. The fences have generally been cut; a few will require cutting next season.

4. **Materials, preparation of**:—Formerly unbroken, dirty materials were used, by which means the road was almost constantly in a very uneven, bad state; now the top of the road has been dug up, the large stones broken, and a good shape given. The gravel is now cleared of sand and clay, by proper screenings, and even washings; the large is separated from the small and well broken, in general, and improvements are daily making in selecting and preparing the middle and side materials separately.

5. **Materials, disposition of**:—After the materials have been prepared as above described, the large and good are applied to the middle part of the road, in such breadths as can be done at one time, and the breadths are extended by every new application. The sides too are coated as the materials for it can be obtained.

6. **Management of labour**:—As much of the labour as can with propriety be let is done by contract, and the work in general well done. The day-men are employed under a skilful good hand, who works constantly with them, and is accountable to the Surveyor for the due execution of the work.

Note:—The Surveyor says, 50 cwt. are frequently carried on wheels of 3 inches in breadth, from Leighton Buzzard wharf to Dunstable, and the adjoining villages, although the legal weight in summer, inclusive of the cart, is 30 cwt. and in winter 27 cwt.; and for which double tolls are only taken, whereas the penalty would amount to a very serious sum. This practice is a very great injury to the road.

DUNSTABLE and PONDYARDS TRUST.—(ANDREW STOKES, Surveyor.)

I.—Materials.

1. **Gravel**:—The gravel of this Trust is all flints, of different degrees of durability as a road material, and, excepting the large hard flint stones in it, is only fit for the sides of a road. The pits are,

1. Dunstable Downs, 2 miles from the town.
2. Delnor Pit, on common ground, about 1 mile from the road.
3. Harpenden Bury Pit, to the eastward of Redburn, and about 1 mile north of the road.
4. Redburn Common, fully one quarter of a mile from the road.
5. Fish-street Pit, about half a mile south of the road from the eastern end of Redburn.
6. Baymont Pit, about one quarter of a mile north of the road near the mill.
7. Redburn Bury Pit, half a mile north of the road, opposite the 24-mile stone.
8. Punch Bowl Pit, close to the north side of the road.
9. Butler's Pit, on the south side of the road near the end of the Trust.

In all the above pits the quality is nearly the same. N^o 6 and 7 particularly good; N^o 8 small, but contains durable material; N^o 9 cannot be cleansed completely, and requires more scraping at first, but afterwards wears well.

Digging, sifting and sorting, from 8 d. to 9 d.	average	8½ p' yd.
2d sifting when necessary, measuring the gravel only		3 —
Breaking, 9 d. to 1 s.		10½ —
Carriage per mile 1 s. to 1 s. 3 d. for 24 bushels, or 30½ ft. or 1½ yd. or 1 —		—

2. **Field stones or pebbles**:—All flints or flinty composition, and principally rough flints; got from 1 to 3½ miles from the road.

Picking, 6 d. to 1 s.	average	9 p' yd.
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The bulk of the flints, whether in the form of pebbles or rough stones, fly into a number of small thin-edged pieces, by a single, rather light blow of the hammer, and are quickly ground into dust. When they break into well-shaped, proper sized pieces, without shivering, they are a lasting, very good material.

Carriage from Carrington Common to Dunstable, 3½ miles, is 4 s. per load		
of 24 bushels, or 1½ yd. or 3 s. 6½ d. p' yd. for one mile		1 —
Breaking, being black and hard		1 —

3. **Quarry stone**:—None in this Trust.

II.—Contract

II.—Contract work.

1. What part of the work is performed by contract, and what are the prices given for it?

1. Digging, sifting, sorting, and carriage of materials, are performed by contract; and the prices paid for them are stated above.

2. Lifting, shaping the road, breaking the stones raised, and scattering them over the middle of it, depth from three to four inches - - - - - 3 d. p' yd.

3. Scraping the road in winter is done at 1 d. to 1 ½ d. per pole } average - 1 ½ d. —
of 5 ½ yards - - - - -

2. What by day-labour; and what are the wages by the day?

Surface-work, such as drilling ruts, patching small hollows, keeping it smooth by the rake, clearing side-drains and water-outlets, and such odd jobs as cannot rightly be estimated; and, occasionally, breaking a few stones smaller for ruts, &c. and removing dirt by teams.

Wages of labourers - - - - - 10 s. p' week.

Note:—Ten men are constantly employed by the day, besides occasional assistance from taskmen.

III.—What is paid for teams, and how many hours a day do they work?

All team work, excepting carrying away spoil, by the load. Teams are employed to carry dirt from streets and waste from the road by the day.

	s.	d.
For each horse - - - - -	3	- p' day.
The cart - - - - -	1	-
The driver - - - - -	1	8

	5	8	—
To this, add two more horses - - - - -	6	-	—

For a team of 3 horses and one driver - - - - -	11	8	—
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The day in the yoke is 8 hours.

IV.—What quantity of statute duty is performed upon the road?

	Days Stat. Duty.	Composition.
1. Parish of Dunstable pays - - - - -	5	and £.4 2 6
2. - ditto - Kensworth - - - - -	44	— 4 14 4 ½
3. - ditto - Coddington - - - - -	60	— 6 16 2
4. - ditto - Harpenden - - - - -	49	— 5 13 8
5. - ditto - Flamstead - - - - -	75	— 8 18 7 ½
6. - ditto - Redbourn - - - - -	94	— 12 5 5
7. The hamlet of Humberstone in the parish of Studham, - - - - -	6	— 2 3 8

Total - - - - -	333	— 44 14 5
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Note:—The Surveyor employs all the statute duty teams in removing spoil banks from the sides of the road, by which the quantity of day-labour is increased.

V.—How far are the general rules complied with?

1. *Form:*—Very great progress has been made in perfecting the shape of the road, by lifting it, making the repairs with new, well-broken stones, and defining the breadth by side drains. The workmen are now employed in shaping the sides, and there is every prospect of its being completed during the present season. A very good alteration has been made on the top of the bank, to the eastward of Dunstable, at the Crescent Inn, by cutting off about three feet; and another at the Chequers Inn, Flamstead, by widening the road there.

2. *Drainage:*—Much pains has been bestowed in under-draining, chiefly by faggots, on both sides of the Packhorse Inn, particularly along the valley between it and Market-street, and the road there is now sound and good. The road has also been a little raised and the sides and watercourses kept clear, in the valley to the eastward of Flamstead, Chequers Inn; and in passing the mill-pool at Redbourn mill, the valley has been raised and proper culverts made; all the other culverts appear to be doing their work properly. In descending to Redbourn, the southern side drain has been deepened a little, and filled with large flints; this plan has been recommended for all the sides where there is danger of their being poached by cattle, and also that all places where water stands along the sides of the road be properly filled up, made smooth, and regular declivities from them given.

3. *Trees and fences:*—The road is a good deal shaded by a small wood near Dunstable gate, and by another at the turn of the road on the bank to the eastward of Flamstead valley. Hedge-row trees on the summit to the westward of Redbourn, and between Redbourn and the mill, grow much too near the road; a few between Redbourn mill and the end of the Trust may also be noticed. A large portion of the hedges have been cut in consequence of the intimidation, but part still remains, which must be attacked next season.

4. *Materials, preparation of:*—All the gravel now used for the road is well cleaned, and the flints are generally properly broken whenever they stand the hammer. It may be observed, however, that some of the workmen are not so attentive as they ought to be, to break them equally and sufficiently small, particularly the best materials, which are frequently left too large on account of their hardness.

5. *Materials,*

5. Materials, disposition of:—Formerly the whole surface of the road was repaired with gravel, the use of which is now nearly totally abandoned, excepting for the sides; the middle is repaired with broken flints, which, in many cases, are also used for the sides, and even laid as far as the side drains.

6. Management of labour:—Piece work has been pretty generally introduced, and good work thereby procured. By due attention to the days-men, they have acquired considerable proficiency in doing their work neatly and readily; and the Surveyor has superior hands to whom he entrusts the execution of certain portions of the works, for which they are accountable.

SAINT ALBAN'S and SOUTH MIMS' TRUST, from Pondyards to Hadley Pillar.

(Mr. JAMES McADAM, General Surveyor; WILLIAM HIGGS, Sub-surveyor.)

I. Materials.

1. Gravel:—The gravel pits now used are as follow:

1. Shafford pit, about a quarter of a mile from the road, and north of it.
2. Ringsbury pit, at the western end of Saint Alban's.
3. Mr. Gough's pit, about three quarters of a mile to the eastward of St. Alban's Gates, north of road and near it.
4. Mr. Bunn's pit, about two miles east of St. Alban's, and quarter of a mile north of road.
5. Mr. Alexander's pit, about two miles and half ditto ditto, and quarter of a mile south of road.
6. Mr. Bunn's pit, about half a mile from London Colney, and about half a mile north of road.
7. Mr. Lingham's pit, about half a mile above ditto, and about half a mile north of road.
8. Mr. Withers' pit, on the west of Ridge Hill, and about three quarters of a mile ditto.
9. Lord Hardwicke's pit, top of Ridge Hill, and about half a mile ditto.
10. Captain Heron's pit, east of Ridge Hill, and about half a mile south of road.
11. Mr Ward's pit, near South Mims, and about quarter a mile ditto.
12. Mr Giddon's pit, about two miles and a quarter ditto.
13. Mr. Robarts' pit, further end of Mims Wash, about three quarters of a mile ditto.
14. Hadley pit, Mr. Taylor's, about one mile and a quarter ditto.

Digging, sifting and sorting, N ^o	Pits.					s. d.
	1, 2, 5, 6, 11, 12	-	-	-	-	at - 10 p' yd.
—	3, 4	-	-	-	-	9
—	7	-	-	-	-	1 1
—	8, 9, 10, 14	-	-	-	-	1
—	13	-	-	-	-	1 2

Second sifting, from 4d. to 6d.	-	-	-	-	-	average - 5
Breaking, paid for the whole	-	-	-	-	-	- 10

Filling and cartage of	N ^o	2, 3, 4, 5, 6					s. d.
		7, 10, 13	-	-	-	-	
—	-	1, 8	-	-	-	-	1 3
—	-	9, 11	-	-	-	-	1 2
—	-	12	-	-	-	-	1 1
—	-	14	-	-	-	-	2
—	-	-	-	-	-	-	2 5

To the above prices for digging must be added the damages to land besides roads.

For meadow land	-	-	-	-	-	-	5 p' yd.
For arable ditto	-	-	-	-	-	-	3 1

Note:—All the pits, excepting N^o 5 and 10, have a light cover from one foot and a half to three feet, 3 and 10 from eight to nine feet; in N^o 1, 2, 5 and 9, the gravel is from nine to twelve feet deep, all the rest from two feet and a half to six feet. The breakable part in the first six pits varies from one-fifth to one-third of the heap, and all the rest about $\frac{1}{4}$, leaving $\frac{3}{4}$ gravel. In pits N^o 1 to 7, the gravel is more easily cleaned than in the remaining pits, which are more clayey and loamy.

2. Field stones or pebbles:

In the district about Mims and Ridge, stones are picked from the grounds and are got for the road, to the distance of about two miles from it; very few of these stones have been procured by the Surveyor, not more than forty loads. He is in future to procure as many as he can.

Delivered on the road by the load of $1\frac{1}{2}$ yard at 4s.	-	-	-	-	-	s. d.
Breaking	-	-	-	-	-	3 3 p' yd.
	-	-	-	-	-	10

Note.—The bulk of the above materials are easily reducible to sand. Flints which break into pieces, having angles 45° or upwards, are generally good.

3. Quarry stones:—None in this Trust.

11. What

II.—What part of the work is performed by contract; and what are the prices of contract work?

1. Digging, sifting, sorting, breaking and carriage of materials, are performed by contract, and the prices are stated above.
2. Lifting, shaping the road, breaking the old stones, and sowing the pieces over the road, so as to give the workable part equal strength, at first 2 d. per square yard was given; now from 1 d. to 1 d. average 1½ d. per square yard.
3. Scraping the road is done by the pole of 5½ yards, and costs 1 d. to 2 d. average 1½ d. per pole.

What part of the work is performed by the day?

Shovelling up gravel, trimming and levelling the sides for laying down gravel, raking the surface of the road, letting off water and stopping low places, breaking odd lots of flints, and other jobs that occur and require immediate attention, but cannot be estimated.

What are the wages by the day?

The wages vary according to the demand for labour in the different seasons of the year.

	s.	d.
Earlier in the season	12	— p' week.
In May	10	6
In harvest	15	—

III.—What is paid for teams?

Contract, excepting odd jobs; for three horses, two carts and one man - 15 - p' day

How many hours a day do they work?

They work from six in the morning till three in the afternoon without intermission, being nine hours.

IV.—What statute duty is performed upon the road?

There is neither statute duty nor composition money allotted for the mail road in this Trust.

V.—How far are the general rules complied with?

1. Form.—The transverse, convex shape of the road surface is elliptical, and with few exceptions, this shape is very regularly preserved. The side drains may be from 6 to 9, or average say 8 inches below the level of the middle. A regular breadth of driving, or carriage way, cannot be kept, the road being in many places confined in very narrow hollow ways of from 4 to 7 or 8 feet below the natural surface of the ground, and between high, close laid mud banks. Where there is room for it the breadth has been extended irregularly, and is not defined by uniform side drains. In some places the road is only 27 feet in breadth between the water channels, or side drains, and in others it is extended to 37 feet.

2. Drainage:—Due attention has been given to this important branch by keeping the cross drains in good order, clearing out the sides neatly, and with proper inclinations longitudinally, and maintaining the surface smooth, and with a proper transverse convexity.

3. Trees and fences:—A small grove of large trees, and some hedge-rows, thick set, standing higher than the road, on the south side, to the eastward of Pondyards, do much injury to the road. Before reaching and in passing St. Alban's cricket-ground, the high banks of the very narrow hollow way, also stand thick with hedge-row trees. Along part of the hollow way between London Colney and the bottom of Ridge Hill, the high banks are similarly covered. Between South Mims and Mims Wash, the road is encumbered in the same way; also in rising from the Wash to Dancer's Hill, both, principally on the south side of the road. In passing Wrotham Park, rising to Kils End Hill, and for the greatest part of the way to the termination of the Trust at Hadley Obelisk, the road is kept in a very wet state after rains, by large trees on the grounds and in the hedges.

The hedges have been kept low, in general, but still a portion remains uncut.

4. Materials, preparation of:—The gravel is sifted, and the large materials are separated from the small, at the pits, and the stones are afterwards very well broken. After the gravel has been carried to the side of the road, and allowed time to become dry, it is sifted a second time. The orders of the Surveyor are, that it be drawn into thin layers, so as to dry it more effectually, and loosen the adhering sand or clay, and to be careful in sifting it well. Still it is not cleaned so completely as could be wished. Perhaps sieves a little wider between the wires, which would not be so easily choked by the clay and sand, might be used with better effect.

A considerable portion of the gravel along the road has been spread thinly on the outside of it, a part scattered over the side drains or water channels, and some lies in the channels. This ought to be avoided where there is room for it on the sides, and the sides should be neatly levelled for the purpose. Wherever there is not room, recesses should be cut in the side banks to hold sufficient quantities, and the side drains kept completely clear.

5. Materials, application of:—The smoothness of the surface of the road, in general, is a proof that the materials have been carefully applied, and kept in their places by repeated rakings and by scraping off the puddle. It may be observed, however, that more care ought to be taken to lay the centre part of the road with broken metal, and the sides only with gravel. For want of this precaution the middle is dusty, and heavy in wet weather, which never can be cured by raking and scraping, so long as small gravel, in a dirty state,

is applied. In several places the broken materials have been extended irregularly, too near the sides where carriages never go, and where the breadth is 30 feet or more.

Thirty feet, well kept, is a proper breadth, and the middle 18 feet ought always to be of the best picked materials.

The water channels, or side drains, ought to be made sound by inferior large stones, laid to a sufficient depth, and covered with gravel of the weakest sort.

6. Management of labour:—The labourers, as far as possible, have been employed by contract, and the execution of their work attended to. Careful, industrious hands have been selected for day-work, and proper notice taken of their time, and the work performed.

ON Wednesday, 29th May, went along on the Edgeware Road, from St. Alban's, by St. Michael's, St. Stephen's, &c. to Radlett. This road has been made with excellent flints and some pebbles, and is hard and pretty smooth. In all the cuttings observed rough flints of pretty large sizes, imbedded in the clay and earth of the side banks, and also lying on the surface of the adjoining fields, and was told at Radlett that some flint pits were open in that neighbourhood. This is about 4 miles from Mims on the road by Shenley Hill. From Radlett rode across towards Shenley Hill. On the summit, about 5 furlongs from Radlett, found a labourer digging and screening gravel in Oldenham Lodge Pit, belonging to Mr. Mason. In this pit flint gravel of large size is got in abundance, but no rough flints. The labourer said he knew of no rough flint pits between Oldenham and Shenley Hill. At Newbrie's farm-houses was informed that some stones, by them called mother stone, were got with the chalk dug for lime by the Earl of Portsmouth. Went to the place pointed out, and saw the stones. They are a close concretion of round flint stones and gravel, such as are seen at St. Alban's, &c. and would make excellent bottoming. The quantity got is inconsiderable, not more than 2 loads. This may be fully $3\frac{1}{2}$ say 4 miles from Mims. Observed a number of rough flints on Lord Portsmouth's fields, which had been laid on with the chalk. Opposite Porter's garden, (Lake White, Esq.) in a field occupied by Mr. Lipscombe, either his own or belonging to a Mr. Grant, found a pit, which had been dug to a considerable depth, with water in it. A small seam of gravel is seen near the surface, and below it sandy clay, white, yellow and brown; below the clay, stones exactly similar to the best brown kind at Brickhill and neighbourhood appear, and one rolled down into the water. This stone lies on the bed in large masses; but in place of a straight, stratified surface, it resembles that of the largest rough flints, though not so irregular or deeply indented. It commences at 4 feet from the top of the pit, but being covered in front with rubbish, could form no idea of its depth. If found in sufficient quantities, it would make excellent bottoming. The pit may be $2\frac{1}{2}$ miles from Mims. If gravel was the object in opening this pit, it must have been left on account of the clay and sandstone formation. Called upon Mr. White's gardener, and was directed by him to a Mr. Lord, Shenley Hill. Mr. Lord had not seen the stone before, but said there was stone at Wellend Pits of the sandstone kind. Examined Wellend Pits, and although the clay was similar to that above the sandstone, yet could only find small thin pieces of pure white sandstone among the gravel. The gravel is large, but may be about 3 miles or more from Mims. Called at the Swan Inn, Wellend, and on all the farmers between Shenley Hill and Barnet, and was informed that no flints of the rough, large kind could be got, excepting what were produced out of the chalk mines and pits at Olney and Rabley lime kilns, and these were bought by the people in the country for paving their courts, gate-ways, &c. about their houses. On my way passed Trotter's Pit on Shenley Hill. This may be 5 miles from Mims or Dancer's Hill. The gravel is good, and about one-fourth, after being sifted, may be broken. Observed on the road from Shenley Hill and Ridge to Barnet, that in the side banks, where the ground for the road had been cut, hardly any flints of consequence could be seen. Passed on to Barnet Common, and upon the road observed the gravel got there. It appeared good, and a considerable portion fit to be broken.

Returned by Ridge, about one mile from Mims, and examined some very good flints, mixed with pebbles, which had been brought upon the road there. Upon inquiry found they had been picked from the meadows and fields about Ridge, and could be got in considerable quantities there and about Mims. Called at the house of the overseer of the parish roads at Ridge, but he was not at home. Mentioned this to the Sub-surveyor, and he said he had lately got a quantity of picked stones, and would continue to procure as many more as he possibly could. Called upon Mr. Reynolds, of Rabley lime-works, about three quarters of a mile from Ridge Hill. He asks 9s. per load for the flints got out of his mines, laid down at Mims. Saw the flints; they are of excellent quality, but the quantity he could furnish would not go far in making a new road. Mr. Reynolds said, that a considerable quantity of flints, and some pebbles, might be picked from the fields in the proper season. Returned from Rabley, by Bridge Hill, to St. Alban's.

WHETSTONE TRUST.—From Hadley Obelisk to Highgate Gate House.

Mr. JAMES MAC ADAM, General Surveyor; WILLIAM HIGGS, Sub-surveyor.

I. Materials.

1. Gravel.—The gravel pits now used are as follow:—

1. Pit:—Barnet common, close to the road.
2. Ditto:—Mr. Hatfield's, about one mile and a quarter from the road, and on the southern side of it.

3. Pit:

3. Pit:—Mr. Dickson's, about a quarter of a mile below Whetstone, and on the southern side of the road.

4. Ditto:—Mr. Wilkinson's, about three quarters of a mile above ditto, and on ditto.

5. Ditto:—Mr. Taylor's, about three quarters of a mile, or one mile and a quarter above ditto, and on ditto.

6. Ditto:—Mr. Brewster's, about two miles and a half from road at Bald Faced Stag, or near Finchley, and on ditto.

7. Ditto:—Miss Leach's, about one mile from road at ditto, and north of road.

		Pits.	s.	d.
Digging, sifting, and sorting	-	N ^o 1.	1	3 p' yard.
"	"	2.	10	"
"	"	3.	1	2
"	"	4, 5.	1	"
"	"	6.	1	10
"	"	7.	2	2

Breaking the large out of all the pits

Second sifting, varying from 4 d. to 6 d. p' yard, average

The damages to land for every yard of gravel dug, is

The above pits to N^o 6, vary from 2 to 6 feet of earth above the gravel.

Ditto - N^o 6 and 7, the gravel is under 18 feet of earth, and 5 to 6 feet of gravel.

The depth of gravel in the whole varies from 3 to 7 $\frac{1}{2}$ feet.

The Surveyor, from his experience, estimates the quantity of breakable in the whole of the pits to $\frac{1}{4}$ part, or $\frac{1}{12}$ of small gravel.

The Surveyor procured a quantity of Scots stone, and has laid them on about the end of the archway road.

Cost - 6s. 6d. per ton, or 7s. 8d. per yard.

Breaking 3s. -d. — or 3s. 6d. —

Twenty-three feet to the ton. They are found to answer well.

II. Contract Work.

1. What part of the work is performed by contract; and what are the prices of contract work?

1. Digging, sifting, sorting, breaking, and carting materials, are performed by contract, and the prices are stated above.

2. Lifting the road to the depth of from 3 to 6 inches, raking off all the large stones and breaking them, shaping the road, and scattering over it equally the broken stones, from 1 d. to 2 d. average 1 $\frac{1}{2}$ d. per square yard.

3. Scraping the road is done at from 1 d. to 1 $\frac{1}{2}$ d. p' pole of 5 $\frac{1}{2}$ yards.

2. What part is performed by the day, and what are the wages by the day?

Shovelling up gravel, trimming and levelling the sides, raking the surface of the road, letting off water, picking up flints, and breaking them, and other odd jobs that may occur, are done by the day.

The wages vary at different seasons of the year.

From 10s. 6d. to 12s. or say average

And in harvest

III.—What is paid for teams?

All the work is done by contract, excepting odd jobs; and for these, 4 horses, 2 carts, and 1 man, 1 l. per day.

How many hours a day do they work?

From 6 in the morning till 3 in the afternoon without intermission, or 9 hours per day.

IV.—What statute duty is performed upon the road?

Neither statute duty nor composition money is paid on this Trust.

V.—How far are the general rules complied with?

1. Form:—The transverse surface of the road is convex and elliptical, and the sides may be about 8 inches of average depth below the level of the middle. The breadth between the side drains varies from 30 to 37 feet. On Barnet Common it is about 36 feet.

2. Drainage:—The cross drains have been kept in proper order, the side drains are clear, with regular longitudinal inclinations, and the surface smooth and convex.

3. Trees and fences:—In the valley between Barnet and Whetstone, and rising to Whetstone, some trees grow too near the road, and also between the Bald Faced Stag and the end of the archway road.

The hedges in general are kept low.

4. Materials, preparation of:—The gravel is sifted and sorted at the pits; the two sorts are then carried to the sides of the road, where the stones are well broken, and the gravel, after being dried, is sifted a second time.

5. Materials, disposition of:—The general surface of the road indicates great attention to neatness in the disposition of the materials, but still every effort should be made to procure hard breakable flints or pebbles for the middle part, in place of the gravel now used, which so soon grinds into dust and puddle.

In conclusion it may be remarked,

1. Care has been taken to avoid any interference unpleasant to the different Surveyors, or to the Trusts to which they belong, and a single instance of it has not occurred.

All the Surveyors were furnished with copies of the road rules, drawn up for their instruction. These they perused with attention, and have, by degrees, been conforming to them, and to the explanations and directions given them personally, in the presence of the workmen, and in writing, in as far as their means allowed.

Many of the labourers, now trained to do their work in a superior manner, and to break the stones well, have begun to vie with each other who shall have the best and neatest road.

2. Field stones and pebbles, quarry stones, and the large stones separated from the gravel, are now, with few exceptions, the material used for the middle part of the road, and the inferior stone and smaller gravel are almost entirely confined to the sides.

Still more labour ought to be bestowed in the quarries and pits, and nothing carted therefrom which is not calculated to make the part of the road to which it is applied perfect.

In the counties of Salop and Stafford, the cinders from the iron works, now used in repairing part of the roads, are only fit for bottoming and the sides. Good stone only, though obtained at a great expense, should be laid on the middle.

3. The road-level has done much good by giving a just knowledge of the right shape; but its use has been circumscribed, owing to the former weak and very dirty state of the scanty portion of stones and gravel made use of in repairing the middle, and the total want of them upon the sides. A road in this condition, perfectly shaped, cannot remain so, but is cut and poached to pieces in wet weather. The great exertions now making in all the Trusts to widen the middle and strengthen the sides, by materials proper for each, will soon enable them to give, and maintain the prescribed shape.

4. Contract work is now adopted for almost every article that can be properly estimated.

5. A Journal has been kept; communication maintained with the Trusts and the Surveyors; plans, estimates and specifications made for widening narrow places and reducing inclinations, in terms of the instructions.

The destructive effects of trees, tall hedges, and their high natural and artificial banks, on the sides of the road, cannot be too often noticed, and the removal of them too strongly recommended. Every description of plants put into a hedge forms a part of it, and when one species only is used it is called a beech, elm, or holly hedge accordingly. If hedges of this kind were allowed to rise to their natural height, on the sides of a road, because the plants composing them are denominated trees, the intention of the legislature, in granting powers to Trustees to cut down hedges to a prescribed height, would be frustrated.

The same observation applies to hedges composed of a variety of plants; all of which, without distinction of species, fall under the powers granted to the Trustees, of cutting them down to the height of five feet above the middle of the road.

The powers granted to Trustees, of lopping trees, can have no reference whatever to hedges, but to the plantations along the sides of the road, of which, the outside branches being unconfined, overhang and do it very great injury.

The practice of planting hedges on the tops of natural banks, and of raising high artificial banks for them, has unintentionally operated, in a great degree, to the destruction of roads; and has, also, prevented Trustees from exercising their powers, in keeping them at the said height of five feet above the road.

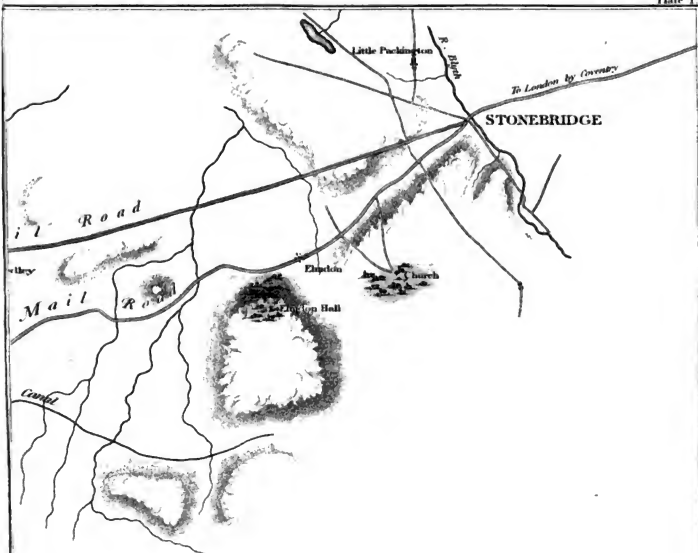
A single row of white, or hawthorn, is the best hedge for the side of a road; perhaps the best in every case. The plants, placed at the distance of four inches, never become so thick in the stem, the hedge occupies the least possible space, is kept clean at a small expense, can be cut to a narrower top, and is thus less liable to be broken by the weight of snow.

The border for them, in cuttings, should be brought to the level of the road.

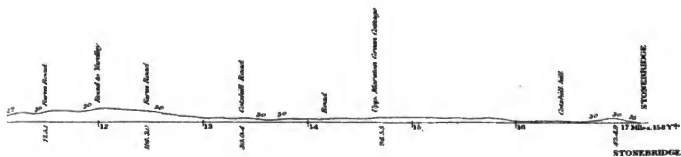
These evils have arisen to great magnitude over the kingdom, and now demand the most serious attention of those empowered, by existing laws, to remedy them, in which, it is to be hoped, the landed interest will soon cordially join, for their own benefit, and for the good of the Public.

June 1, 1822.

John Easton,



HOLYHEAD ROAD;
MAP of the PRESENT and PROPOSED MAIL ROADS
 Between
THE CANAL BRIDGE at MOXLEY West of WEDNESBURY,
 and
STONEBRIDGE near MERIDEN on the COVENTRY ROAD.
Surveyed under the Direction of Thomas Telford
 1821.



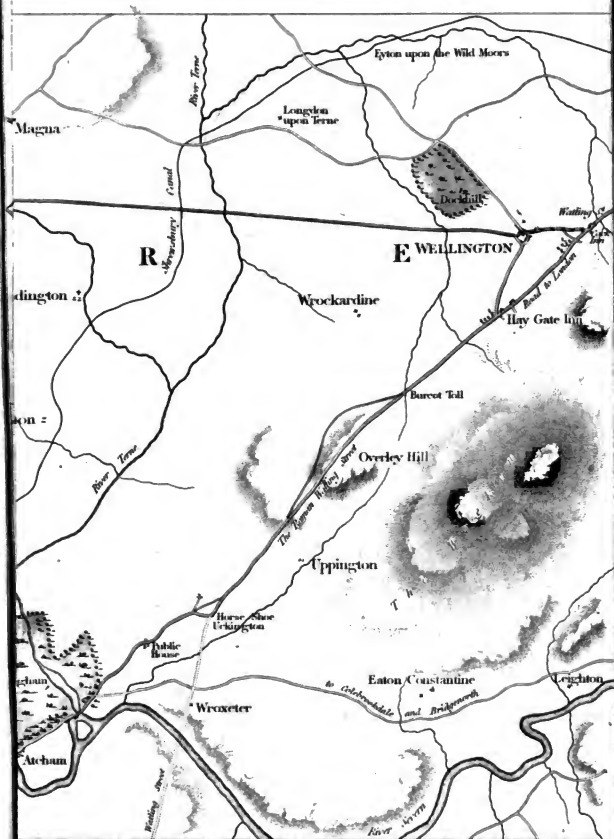
HOLYHEAD ROAD.

PS of the present and proposed MAIL ROAD from
to the COCK INN in the WATLING STREET
between HAYGATE and SHIFNAL. COUNTY of
Salop.

tion of the new Line. Surveyed in 1821 under the direction of Tho: Telford.

Scale of Miles and Furlongs.

0 1 2 3 Miles.



A. D. Cross Smith engr.

F I F T H
R E P O R T

OF THE
SELECT COMMITTEE

ON THE
R O A D S
FROM LONDON TO HOLYHEAD;

AND

Into the Regulations for Conveying His Majesty's Mail
between London and Dublin,

&c. &c.

STEAM BOATS;

&c.

Ordered, by The House of Commons, to be Printed,
12 June 1822.

THE REPORT	- - - - -	p. 117
MINUTES OF EVIDENCE	- - - - -	p. 133
APPENDIX	- - - - -	p. 197

FIFTH REPORT.

THE SELECT COMMITTEE appointed to inquire into the state of the Roads from *London* to *Holyhead*, and from *Chester* to *Holyhead*; into the regulations for conveying His Majesty's Mail between *London* and *Dublin*, and between the Northern Parts of *England* and *Dublin*, and between *Dublin* and the interior of *Ireland*; and into the state of the Mail Coach Roads in *Ireland*; and to report their Observations thereupon, together with the MINUTES of the EVIDENCE taken before them, from time to time, to the House;—HAVE agreed to the following REPORT.

YOUR Committee, since they presented to the House their Second Report, have prosecuted the inquiry, then only just begun, into the important subject of Steam Boats.

The first instance of applying Steam to vessels, is that which occurred in 1736, when Mr. Hull obtained letters patent for the construction of a Steam Boat for towing Vessels in and out of port. The application of paddle wheels, now so generally adopted, appears to have been originally suggested by this patent. Mr. Hull proposed to employ the atmospheric engine of Newcomen, which by means of a crank, communicating with the working beam, imparted a rotary action to the wheels and paddles which were placed at the bow of the vessel. Next in succession were the experiments of the Duke of Bridgewater, to use Steam Boats for towing Barges on Canals; and then came those of Mr. Miller, of Dalswinton in the county of Dumfries, in a double vessel with the wheel in the middle. But after Mr. Hull, the Marquis de Jouffroy unquestionably holds the most distinguished rank in the list of practical engineers, who have added to the value of the invention: In 1781, he constructed a Steam Boat at Lyons of 140 feet in length; and with this, he made several successful experiments on the River Soane. In 1795, Lord Stanhope constructed a boat to be moved by Steam. In 1801 Mr. Symington tried a boat that was propelled by Steam on the Forth and Clyde navigation. Still no practical uses resulted from any of these attempts. It was not till the year 1807, when the Americans began to use Steam Boats on their rivers, that their safety and utility was first proved. But the whole merit of constructing these Boats is due to natives of Great Britain; Mr. Henry Bell, of Glasgow, gave the first model of them to Mr. Fulton; and went over to America, to assist him in establishing them; and Mr. Fulton got the engines he used in his first Steam Boat on the Hudson river from Messrs. Boulton and Watt. Steam navigation seems to have made great progress from this time in America. It appears from the Report of the Select Committee of the Session of 1817, on this subject, that there were then seventeen large Steam Boats in constant employment on the American rivers, besides ferry boats; a list of Steam Boats has been published by Mr. Robinson, that shows that on the Mississippi alone, the tonnage of those in work at present, amounts to 7,259 tons, and of those building to 5,995 tons. There are now, in all, about 300 Steam Boats in use in America.

Mr. Bell continued to turn his talents to the improving of Steam apparatus, and its application in various manufactures about Glasgow; and in 1811, constructed the Comet Steam Boat, of twenty-five tons, with

See App. p. 2. of Partington on the Steam Engine.

ib. p. 57.

See Mr. Watt's Letter, p. 210.

See evidence of Mr. Seth Hunt.

See Partington, p. 67.

Page 238.

an engine of four horse power, to navigate the Clyde between Glasgow and the Helensburgh Baths, established by him on an extensive scale. The success of this experiment led to the constructing of several Steam Boats, by other persons, of larger dimensions and with greater steaming power; these having superseded Mr. Bell's small Boat in the Clyde, it was enlarged, and established as a regular Packet between Glasgow and the western end of the Caledonian Canal at Fort William, by way of the Crinan Canal in Argyleshire. Mr. Bell about the same time constructed the Stirling Castle Steam Boat, and employed her on the river Forth, between Leith and Stirling; he afterwards took her to Inverness, where she has been for two years plying between that town and Fort Augustus, going seven miles by the Caledonian Canal, and twenty three miles along Loch Ness. Many other Boats were successfully established about this time on the Forth and Clyde, and several on the rivers Tay, Thames, Mersey and Humber, and between Southampton and the Isle of Wight; but it was not till the year 1818, that a Steam Boat was made use of to perform regular voyages at sea. In this year the Rob Roy, of ninety tons, built by Mr. Denny of Dumbarton, and with an engine of thirty-horse power, made by Mr. Napier of Glasgow, plied regularly between Greenock and Belfast, and proved the practicability of extending the use of the Steam Engine to Sea Navigation. In the year 1819, the Talbot, of one hundred and fifty tons, built by Messrs. Wood, with two thirty-horse engines made by Mr. Napier, plied daily between Holyhead and Dublin, throughout the whole summer and autumn, and successfully encountered many severe gales. In the year 1820, the Ivanhoe, of one hundred and seventy tons, built by Mr. J. Scott, with two thirty-horse engines made by Mr. Napier, was established on the same station; and in 1821, the Postmasters General introduced Steam Boats at Holyhead and Dover for the conveyance of the Mails. During these three last years, the Belfast, Robert Bruce, Waterloo, Eclipse, Superb, Majestic, and Cambria were constructed, of large tonnage, and with engines of great power, for conveying passengers between Greenock and Belfast and Liverpool; between Liverpool and Dublin; and between Liverpool and Baginbun in Flintshire. All these vessels, except the Cambria and Belfast, were constructed in the Clyde. In the year 1821, the City of Edinburgh and Mountaineer were established to go between London and Leith; and, in the present year, there have already been fitted for sea the St. Patrick and St. George, at Liverpool; the James Watt, for the Leith and London station; the Swift, to go between Brighton and Dieppe; the Sovereign and Union, between Dover and Calais; and the Lord Melville, to go regularly between London Bridge and Calais; twelve more are in hand, and will be completed this summer. Ferry Boats propelled by Steam, sufficiently commodious to carry carriages, horses and cattle, have been established with great public utility on the Tay between Dundee and Fifeshire; at the Queen's Ferry, in Scotland; on the Severn, the Mersey and the Humber, and at other ferries.

Mr. Napier's
Answers, p. 234.

See App. p. 198,
for the tonnage and
power of all these
vessels, and for
the names of the
builders and engine
makers.

See App. No. 1.

In the Appendix there is a list which has been made by Mr. Field, of all the Steam Boats which have been built in the United Kingdom, showing their tonnage* and the power of their engines; the names of the builders and of the engine makers; the date of their being launched, and also the station where they ply; from this list it appears, that in the space of a very few years the public have been accommodated, in all directions, with this safe, rapid and economical mode of conveyance.

* The tonnage of Steam vessels in this Report and in the Table in the Appendix, No. 1, is stated according to the customary method of calculating it in other vessels.—The way of calculating the tonnage of Steam Boats is specially regulated by 59 Geo. 3, c. 5.

The experience of what Steam Boats have performed, is fully sufficient to place beyond all doubt their safety even in the most tempestuous weather. The Rob Roy plied two winters between Greenock and Belfast, and last winter between Dover and Calais; the Eclipse plied the whole of last winter between Glasgow and Belfast, and the Cambria between Liverpool and Bagilt; a Steam Boat has plied regularly, through all seasons, between New York, the Havannah and New Orleans; all the other Steam Boats which have been used at sea have been exposed to numerous severe gales. But the trial which the Holyhead Steam Boats went through during the last tempestuous winter, from the nature of the service requiring them to go to sea at a fixed hour every day, proves that Steam Boats, when properly constructed, are able to go to sea when Sailing Vessels could not, and that in some respects they possess, in very bad weather, advantages over Sailing Vessels. The following extracts from the evidence of Captain Rogers is quite conclusive as to the power and safety of Steam Boats at sea.

See Mr. Napier's letter, p. 233.

"Q. Have you had full trial of the Steam Packets, with respect to gales of wind?—A. Yes, in every way. I crossed in the Meteor, on the 5th of February, in the heaviest sea I have seen during eight years I have been on the station.—Q. Have the Steam Packets sailed regularly during the whole winter?—A. Except a very few days; I have seen them go several times when Sailing Packets could not.—Q. Have you found that the Steam Packets built under the inspection of the Navy Board are as safe as any vessel you ever navigated?—A. Certainly.—Q. Is there any danger, in your opinion, to be apprehended from them as Steam Vessels?—A. No.—Q. Are you of opinion, that in the event of the engine failing, with the assistance of sails and the anchor you may keep a Packet in perfect safety?—A. There is no doubt of it; by putting two cables together, which she has on board, she would ride out any gale in the Channel as easy as a glove.—Q. Are the Committee to understand your opinion to be, that in any weather, however severe, the Steam Boats will stand that weather as well as any Sail Boat?—A. Yes, in any wind; the more wind the better for the Steam Boats; that is where they show their superiority.—Q. In the heaviest gale that could blow, you would rather be in a Steam Packet than a Sailing Packet?—A. Yes; that is, in a vessel of our construction.—Q. Have you found, in blowing weather, that the vessel works at all, either inside or out?—A. No, not at all; I do not see it in the least, not a single thing, she is as solid as a wall.—Q. Was the last winter a worse winter than usual?—A. I have heard it said that it has been the worst winter for fifty years; Lloyd's have paid more this winter than ever they did.—Q. Can you carry one boat on each quarter?—A. We can carry two, but all that is lumber; we never think of being drowned or burnt now." In another place Captain Rogers says, "I never read a novel before I was on board a Steam Packet, and I go down now frequently and read for an hour or two."

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The following extracts from the answers of the other Holyhead Captains, corroborate the evidence of Captain Rogers. Captain Goddard says, "These vessels by their performances through the past winter, have exceeded the most sanguine expectations; and certainly have made passages across the Channel, when the Sailing Packets would have found extreme difficulty to have accomplished them; and in so short a period of time as places their performance beyond the necessity of comparison to establish their great superiority." Captain Skinner says, "I am of opinion, a Steam Packet of about one hundred and eighty tons burthen, form similar to that of the Meteor, with a little finer entrance and strength of building, with masts and sails the same, would be the best; a vessel of

that description would be able to make a voyage, when it was fit weather for any other vessel to put to sea." Captain Davies says, "the two vessels on this station have answered wonderfully well."

The testimony of the Holyhead commanders is not only extremely important, in consequence of the experience they have had of the performance of the Steam Packets during the last winter, but also because it is to be recollected, that even after the Talbot and *Ivanhoe* had been on the station, it was their opinion that no vessel could perform the winter service with safety but Sailing Cutters, such as the old Holyhead Packets. This opinion it was natural they should entertain, knowing so well as they did, the heavy seas and desperate gales which frequently prevail for weeks together in the Irish Channel. But the trial of last winter having now brought them to acknowledge a change of opinion, this circumstance does every thing that by possibility could be wanting to establish, upon the best authority, the safety and superiority of Steam Boats for this service.

Notwithstanding the great number of Steam Boats which have been constantly in use, in different parts of the kingdom, during the last ten years, very few accidents have occurred, and these few were chiefly owing to the novelty of the experiment: so many precautions are now taken that there is no reason to apprehend the recurrence of any serious accidents. The general use of low pressure boilers made of wrought iron or copper has removed the possibility of accidents from their bursting. If one of these boilers gives way, the materials do not fly, but are rent asunder. This part of the subject was very fully investigated by the Select Committee on Steam Navigation in 1817; and the evidence given before that Committee contains every thing that is necessary to remove all apprehensions of danger from the bursting of low pressure boilers. In respect to the furnaces, they are so constructed that there is no danger from fire, because there is water all round them. Mr. James Brown says, "I hardly think it possible that fire can take place, because the furnaces are completely surrounded with five inches of water round every part." The coals are kept in iron cases so as to prevent all communication with the fires; and if, in addition to these precautions, vessels are supplied with extinguishing fire engines, there is no danger of accidents from fire. It has been suggested, that Steam Vessels are not provided with a sufficient number of boats, and that an Act of Parliament should be passed to require every vessel to carry a certain number, according to her tonnage: but Your Committee, after the fullest consideration, are strongly of opinion that the policy of avoiding to do any thing that could by possibility check the spirit of improvement which now is so prevalent, and which promises such great advantages to the public, is that which ought to be followed. It is to be remembered, that the expense of fitting out Steam Vessels is very heavy, and that proper experiments of new inventions cannot be made but with the risk of incurring considerable loss; and as nothing would check the zeal of those who are disposed to make such experiments so certainly as the meddling of officers exercising the powers of a regulating Act of Parliament, nothing could be more baneful than the interference of the Legislature with this new branch of science. The Ballast Office of Dublin brought a bill before the House of Commons last year, for the purpose of appointing inspectors over the Liverpool and Dublin Packets; but the Chief Secretary of Ireland, Mr. Grant, very judiciously put a stop to its progress. Individual security in Steam Boats will always be sufficiently provided for, by the interest of the proprietors constantly contributing to lead them to do all those things which will best obtain the custom of the public. Competition in this case,

case, as in all others, will more effectually establish those precautions which are right to be taken, than the best devised regulations of an Act of Parliament. But at the same time that Your Committee decline to recommend any Legislative control, they are decidedly of opinion that the owners of Steam Vessels who omit to provide a sufficient number of boats, to secure the safety of their passengers, in case of any sudden accident, are guilty of great neglect, and not deserving of the countenance and support of the public. Besides this precaution, in respect to Boats, there ought to be on board every Steam Boat, for the perusal of the passengers, a certificate of some experienced engineer, to testify the strength of the boilers; the sufficiency of the valves; the safety of the furnaces, and the general good condition of the vessel and machinery.

The speed and regularity with which Steam Boats perform their voyages, is the next point worthy of being brought under the notice of the House.

The average length of the voyages of the Holyhead Packets, from the 1st of June 1821 to the 1st of June 1822, has been about seven hours and a half; the average of the Sailing Packets was fifteen hours. Captain Percy, who commands the Hero London and Margate Packet, says, "We generally make the passage in seven hours and a half, the distance being eighty-four miles." Mr. James Brown says, "the Edinburgh Castle has gone from London to Leith in fifty-eight hours, a distance of four hundred and fifty miles; but that the James Watt is a faster vessel, her speed being ten miles an hour through still water, independent of wind and tide." Mr. Traill states, that the Majestic has performed the voyage from Greenock to Liverpool, a distance of two hundred and forty miles in twenty-two hours; and that the Saint Patrick came from Dublin to Liverpool, one hundred and thirty miles, in thirteen hours and a half, against a stiff breeze from the east. The Lord Melville goes from London Bridge to Calais in eleven or twelve hours. This great speed with which the voyages are made by Steam Boats, adds considerably to their superiority over other vessels in point of safety; for in the same degree that the time occupied in performing a voyage is diminished so is the risk of danger also to which passengers are exposed.

It is now evident that the failure of all the early attempts to apply Steam to sea boats, was owing to their being built too square; to their want of strength, and to the want of a sufficient quantity of steaming power. According as boats have been built with a form planned on better sailing principles, with greater strength of timber, and with engines of increased power, the progress of their success has exactly corresponded with these improvements.

On referring to the list of Steam Boats in the Appendix, the Talbot and Ivanhoe on the Holyhead station, and the Belfast, Eclipse, Superb, and Majestic on the Greenock and Liverpool passage, will be found to be the first strong and powerful Boats which were built, and they were the first that completely succeeded. The strength and power of the Holyhead Packets are clearly the cause of their success; and the still greater power which has been given to each of the new boats the St. Patrick and St. George, lately built at Liverpool, namely, of two fifty-five-horse engines, promises to make them superior to any of their predecessors.

Your Committee having thus briefly given a general description of the rise and progress of Steam Navigation, will now proceed to make such observations, as the information they have obtained seems to justify, upon the more scientific part of the subject; and in doing this, they will divide it under four heads;—1st, The Form of the Vessel;—2d, Her Strength;—3d, The Machinery;—4th, Sails.

See App. No. 2.

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Pages 149. 160.

I. FORM OF VESSEL.

- Page 140. Captain Rogers says, "In building a Steam Boat she ought to have a fine entrance, and her bow to flar off, not to shove any water before her; she should have a good line of bearing, and her transom pretty square, and not too high: the transom being square and low, and fine under, so as to give her a right line of bearing, will stop her pitching and rolling, and make her easy on the sea, and add to her speed." Captain Townley, who has been commanding Steam Boats, since 1819, between Dublin and Liverpool, says, "As to form, a Steam Vessel should have an extreme fine entrance below, rise well forward, and flam off, so as to let her fall easy into the sea, and throw it off when steaming head to wind; she should have but little rise of floor, so as to be pretty flat under the engines, and run off as clean as possible abaft: I approve of giving them a good deal of rake forward." Captain J. Hamilton, of the Arrow Post Office Dover Packet, recommends for wet harbours "a vessel with a rising floor about three inches hollow, to prevent her rolling; fair and easy curved water-lines; the stem to rake well, which makes her easy, going head to sea; the stern post to stand square to the keel, and to draw from seven feet nine inches to eight feet water." Mr. John Scott, ship builder at Greenock, says, "I have continued to make the fore body of my vessels very fine, with a good entry, which I have always found made the vessel sail faster, and easier impelled." Messrs. Maudslay and Field say, "The form of a Steam Vessel under water should be that of the fastest schooner, bold at the bows, the whole vessel rising but little out of the water; the spongings, or projecting work on the sides, added to the proper body of the vessel, and rising from the water-line at an angle nowhere exceeding forty degrees from the perpendicular of the side; the bulwarks, wheel cases, and all the exterior of the vessel, smooth and free from projections that would hold the wind." Messrs. J. and C. Wood, say, "The vessel should be formed with a fine entrance and run; sharp raking bow, both below and above; a broad transom not too high placed; a good rise in the floor, limited by the draught of water and the occasion of taking the ground."
- Page 207.
- Page 209.
- Page 216.
- Page 212.
- Page 223.

II. STRENGTH OF THE VESSEL.

- Page 140. The regularity, speed and safety with which the Holyhead Steam Boats crossed the Irish Channel, throughout the whole of last winter, are the best evidence of the vast importance of great strength in the construction of this description of Vessels. Captain Rogers says, that he would rather be in a Steam Boat, in the heaviest gale that could blow, than in a Sailing Packet, if constructed like the Holyhead Steam Boats; and it is evident, from his whole testimony, that the great confidence he places in them is on account of their prodigious strength. He says, "their strength is owing to their being filled up solid to the floor head; to the timbers being put together and diagonally fastened on Sir Robert Seppings's plan; to their being caulked inside and out, having no tree nails, but bolted, and copper fastened; the bolts being driven on a ring clinched at both ends."
- Page 219. Sir Robert Seppings, in his answers to the printed queries of the Committee, respecting the proper strength of a Steam Boat, says, "In point of strength, I consider that the principle introduced into the Sovereign and Meteor (Holyhead Packets), should be generally adopted in all Steam Vessels; and in fact in all other vessels, but particularly in those of the Packet class; as it gives safety in the event of the loss of the keel, and also a proportion of the plank of the bottom; either of which would be the destruction of a vessel constructed on the common principle." Sir Robert Seppings having delivered, with his answers to the printed queries, a description

a description of his mode of building ships, accompanied with drawings to explain it, Your Committee have inserted them in the Appendix to this Report, in order to give as much publicity as possible to his valuable invention. Messrs. Maudslay and Field say, "The straining of a vessel at sea has frequently broken some parts of the machinery, but in a vessel well adapted for the open sea, her great strength should be a security against accident from this cause; the vessel should be exceedingly strong." Mr. J. Cook, of Glasgow, recommends that a Steam Vessel of one hundred and eighty tons should be built with a scantling for a Sailing Vessel of twice that tonnage. Mr. Roger Fisher says, "There has been, in my opinion, a great improvement made in the strength of Steam Vessels built here (Liverpool) lately; that is, by carrying the frame timbers up so as to form the projection of the sides, and then regularly planked up solid as any other part of the vessel, by which means they are much safer." Mr. Brunel, when asked whether he would recommend a Steam Boat to be built much stronger than usual for Sailing Vessels? gave the Committee to understand, that great weight would be injurious, by lessening the buoyancy of the vessel; but Captain Rogers's evidence corroborates the opinions of the other witnesses, and seems to show that this inconvenience does not follow:—"Q. Have you found those two vessels (the Holyhead Steam Boats) equally buoyant with any other you have sailed in?—A. Yes.—Q. Has the great weight of their timbers, and other materials, diminished their speed?—A. No; I think it rather gives them speed against a sea.—Q. Then the inconvenience anticipated from the mode of constructing these vessels has not taken place?—A. No; it has not." Mr. George Henry Freeling says, "I have attempted to gain some information about every Steam Vessel which has been built; and I am convinced these vessels (the Holyhead Packets) will do what no other vessels can do, they will go to sea in weather when nothing else can; I attribute that not only to the machinery, but to the great weight of the hull; a lighter vessel in a heavy sea would be checked; but these vessels have from their weight a momentum so great that it carries them on when a lighter vessel would be checked; the weight acts as a fly-wheel." "I have the authority of Mr. Lang of the Navy Board for stating, that with the exception of the Discovery ships, there are no vessels so strong."

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Pages 134, 135.

III.—MACHINERY.

The Steam Engine, employed on board ships, is as yet a much less perfect machine than when it is used on land; the height of the cylinder is nearly one half less; the power is thereby cramped by short strokes, which are incalculably bad. In this way there is a great loss of power, as the *vis inertiae* is to be overcome on every stroke; more frequent alternations are necessary of the beam, the piston and the valves, which occasion more wear, and more friction than where the cylinders are made longer. There is also a considerable loss of power in converting the alternate motion of the piston into the rotary motion of the paddles.

The Engines, as now used at sea, want some contrivance to enable them to bear with the irregularity of the pressure on them; sometimes there is a vast excess, sometimes a deficiency, and sometimes a total absence of the resisting medium. "These irregularities throw the ungoverned and almost irresistible power of the Steam Engine into those convulsive starts that meet no other controlling check but the arm of the crank, from which it recoils with increased energy to the opposite side, occasioning thereby those destructive shocks, those alternate strains and wrenchings, which a frequent recurrence must render fatal to the cranks and to the shafts,

Mr. Brunel's evidence, pp. 175, 176.

besides other parts of the Machinery." To remedy these defects by such combinations of Machinery as may enable the Engine to adapt and accommodate itself spontaneously to all the exigencies incident to its peculiar service, is one of the chief objects which should attract the attention of Engineers.

The great size of the Boilers, as now made, is very disadvantageous. They occupy a very inconvenient portion of the space within a vessel.

The method of fixing the Paddles is a very defective part of the Machinery: the oblique action of them in entering and departing from the water, produces that tremulous jarring which serves to loosen the seams and the bolting of the knees and beams of the vessel; it also occasions a very great loss of the steaming power.

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In respect to the degree of strength proper to be given to the Machinery, almost all the Engineers, who have been examined, concur in the opinion that it ought to be very considerable. Messrs. Wood say, "all the connecting Machinery should be twice the strength for ordinary work on shore." Mr. Donkin says, that every part of the engine should be made at least of three times the strength, which, by estimation, would be required for any force to which it might be exposed. "Accidents," he observes, "are most likely to happen at a time when the suspension of the power of the engine would be most fatal."

Wrought iron is strongly recommended to be used in place of cast iron; and though some of the witnesses have expressed doubts of the practicability of making large shafts of wrought iron, Mr. Donkin does not hesitate to say, that "they can always be got quite perfect, if a sufficient price is given for them."

As so much of the safety of the vessel depends upon the workmanship of the materials, they should be proved before they are used, by a proper proving engine for trying their strength, as well by a force acting in a twisting direction, as by a strain in the direction of their length.

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Pages 156, 158, 170.

When Mr. James Brown was asked by the Committee, "Is an engine liable to that extraordinary pressure upon it, under particular circumstances, that it is better to have some part of it that would give way?" replied, "I should think so." Mr. G. H. Freeling says, "there must be some part of the engine left to give way in case of any emergency, which is better than destroying the cylinder." But Mr. Timothy Bramah, Mr. Donkin and Mr. Field, say, that the engine should be made so strong, that it may be brought to rest without the fracture of any of its parts, in case it met with a resistance that would require its ultimate power. They mention instance that have come under their own personal observation, of engines having, in this way, stopped with no other effect than that of the steam forcing open the safety valve and going off.

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It may be collected from the evidence, that the greater part of the breakages which have occurred of different parts of the Machinery in Steam Boats, has been owing to the negligence of the engine keepers; Starting the engine without clearing off the water which is formed on the top of the piston, from condensed steam, is one cause of fractures; other accidents have arisen from suffering the bearings upon which the shafts work, and the links connecting the piston with the beam, to get loose; and in some cases from making them so tight, that the bearings heat; and also from not attending carefully to the steam valve when the vessel is exposed to a heavy sea. Mr. Watt says, "with the experience now obtained, we make no doubt but that we shall be able to construct Machinery less liable to accident; but much must always depend upon the vigilance

vigilance and experience of the men who work the engines." Mr. James Brown being asked what were the causes of accidents to the Machinery, replied, "they depended more on the engine keepers than any thing else."

Mr. Donkin says, "I have reason to believe that some of the Steam Boat Companies have suffered severely from a want of regular professional inspection;" and being asked, "Do you conceive that the injury to engines from neglect is greater than the injury arising from the actual working of them?" replied, "Yes, I do;" and being further asked, "Has that been a constant defect in the management of Steam Boats up to this period?" replied, "Yes, I conceive so."

All the evidence is so decidedly in favour of making boilers of copper, that it is necessary only generally to refer to it. Messrs. Fenton and Murray, of Leeds, say, "The boiler ought to be what we call a combined boiler, viz. three distinct boilers put together to form one boiler, with the fire passing three times through each, and so constructed as to be taken up and down a hatchway without pulling up or destroying the decks."

Page 115.

Mr. Donkin and Mr. T. Bramah are of opinion that all boilers are now made too large, and that the same quantity of steaming power might be obtained with a smaller body of water, if the surface of the boiler exposed to the fire was sufficiently large.

All the witnesses agree in opinion as to the necessity of keeping the machinery as low as possible in the vessel: Mr. Watt says, "this will diminish the top weight, make the vessel more steady at sea, improve the action of the machinery, and add to the safety of the vessel." Messrs. Maudslay and Field say, "The best arrangement of the machinery, and in which engineers are most agreed, is to place the boiler or boilers a few feet abaft the centre of buoyancy of the vessel; the two engines on each side, a few feet forward of this point; and the coals on the centre of buoyancy: this arrangement brings the fuel, which is constantly variable, on a point that will not affect the trim of the vessel; it also brings the wheelshaft, which is at the foremost end of the engine, to its best position as regards the length of the vessel, viz. at about one-third from the head: the weight of the boiler, engine and coal, is thus spread pretty equally over the space allotted for them, and partial and intense weight on any one part is thus avoided."

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Several of the witnesses having mentioned the injurious effects of sea water upon the boilers, Your Committee examined Mr. Michael Faraday, who acts as chemical assistant to Mr. Brande at the Royal Institution, concerning the chemical properties of sea water. Mr. Faraday's evidence explains the temperature and degree of saturation of the water in the boilers at which various salts are deposited, and by what process the metals, of which the boilers are made, are injured. It appears that the greatest care is requisite on the part of the engine keepers to prevent the water in the boilers from being so much saturated as to occasion the deposition of the salts. When this takes place, these salts corrode the metal, and destroy a portion of it, and form crusts over the internal surface of the boilers, which having bad conducting powers as regards heat, diminish the quantity of the steam, and cause the fire to burn the boilers and the flues.

Mr. Faraday explains, that the injury done to iron boilers by the deposition of salts, is much greater than the injury which is done to copper boilers; an additional and a very strong reason for using the latter.

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Messrs. Maudslay and Field state, that the fire-places and boilers are frequently burned and injured from the incrustations made by deposited salts in the boilers, through neglect to change the water and clean the boilers; and Mr. Donkin says he has known great inconvenience from the same cause. In one instance, going to Margate, one out of three boilers in the vessel produced very little steam, in consequence of the incrustations on the bottom, a circumstance that was discovered by its requiring very little water to be introduced into it. Mr. Donkin further says, that he knows only of two methods by which the deposition of salt can be prevented. "In the Regent Steam Boat, they employed a method very successfully, that of pumping hot water through the boiler, and allowing a certain quantity constantly to be discharged from it into the sea; by these means the water was always kept in a sufficiently diluted state, so as to prevent its becoming saturated with salt, and consequently none could be deposited. No other inconvenient effect was produced than a greater consumption of fuel. The other mode is the common and ordinary one of taking out the whole of the water when the vessel arrives at the place of destination, and if there is any deposit of salt, taking that out also."

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In consequence of the injury which sea water does to iron, Mr. Cooke recommends that the air pump, buckets, rods and valves should be made of copper or brass.

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It is necessary that great care should be taken in selecting coals to be used in Steam Boats; they ought to burn free and become complete white ashes, without caking on the fire bars. Mr. Brown says, "that in the first passage he went in the City of Edinburgh to Leith, they were obliged to clear the fire every four hours; but having got a better description of coals at Leith, called Halbeath Main, they went, in coming back, sixteen hours without clearing the grates." Mr. Donkin says, "I think the coals ought to be particularly attended to; first, the kind of coals, and secondly, to avoid taking small coals, so long as the common fire-places are used; small coals occasion great waste; and all coals employed for Steam Boats ought to be screened." There is another reason why attention should be paid to the selecting and managing of the coals, arising from their tendency to fire spontaneously, if put together in large quantities in a damp state, and then exposed to the heat of a Steam Boat.

See Evidence of
Mr. Donkin, p. 172.
and of Mr. Faraday,
p. 190.

It will be seen by the evidence, that the consumption of fuel differs very much, according to the various plans on which the engines are constructed, even where the steaming power is the same.

In adapting the quantity of steaming power to vessels, the object, as yet, seems to have been to obtain a great degree of speed in smooth water. But this principle, in respect to sea vessels, is clearly an erroneous one; for the proper object is not so much having great speed through smooth water, as a certain progress, even at a very moderate rate, against a head sea in a heavy gale of wind.

The quantity of power sufficient to accomplish this is that quantity which should be applied to every sea boat, if her size and draught of water will admit of it. Mr. Donkin says, "from the observations I have made in most vessels, I have found them to have too little power for the size of the vessels:" he recommends that the engines should be made considerably larger than necessary for giving the vessel the required velocity in still water: he says, "there is no other disadvantage from increasing the power of an engine than the room it requires and the expense; but to counterbalance these, there is an advantage in not being obliged, at all times, to work the engine up to the extent of its full power; less fuel would be consumed, and the engine would be less likely to go out of order."

Mr.

Mr. T. Bramah says, "you cannot have too much power; indeed it is always of advantage to have as much power as can be obtained." Messrs. Maudslay and Field say, "with regard to the quantity of power proper to put into a sea vessel, the only limit should be the weight of the engine and fuel the vessel will carry and contain; no vessel ever had too much power, even in still water, much less when contending against a heavy head wind." "Two engines," they go on to say, "of half the power each, are more manageable, and possess many advantages over one of the whole power; they produce a perfectly uniform rotation in the wheels, and are not subject, like single engines, to be stopped on the centre in heavy seas; and in case of injury to one engine, the other is available."

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It appears from Mr. Brown's evidence, that two fifty-horse engines will weigh from twenty to twenty-five tons more than two forty-horse engines; the weight of the latter, with coal and water complete, being one hundred tons. The additional expense would be about 1,000 *l.*; the expense of two forty-horse engines being about 6,000 *l.* According therefore to the opinions already stated, when a vessel will contain two fifty-horse engines, it will be decidedly better to have them of this power than two of forty-horse power.

Notwithstanding the great and rapid progress which Steam Navigation has made, it is still considered by the ablest engineers to be only in its infancy: experience suggests, in every new vessel and engine, some improvement to be made, or some defects to be removed. The numerous companies that have been formed in so many parts of the United Kingdom, have established an extent of competition which necessarily excites all the science of the country, to seize on every opportunity of making every thing better than it has been made before; and as the confidence of the public in Steam Boats leads to the general use of them, there is that fair reward for enterprising undertakings which will effectually sustain the general spirit which prevails amongst all the most scientific engineers, seamen and ship-builders, to invent further improvements.

It appears from the evidence, that attempts are now making by very ingenious individuals to remove some of those defects, which have been described to belong to the engines now in use.

Mr. Brunel is engaged on a plan for making the engine more compact and more simple, and at the same time stronger; and to enable it, by certain mechanical combinations, to adapt and accommodate itself to all the exigencies and to all the perturbations incident to its peculiar services.

Page 177, 178.

Mr. Galloway and Mr. Perkins feel confident that high pressure boilers may be so contrived as to be used with the greatest advantage. Mr. Perkins, in his Answers to the Circular Queries, gives such strong evidence in favour of them, from the actual use of them in 150 American Steam Boats, as to go far towards removing the prevailing objections to them.

Pages 188, 237.

Mr. Donkin is of opinion that a rotary furnace, on Mr. Brunton's principle, may be applied to Steam Vessels. This would be so very valuable an improvement, that Your Committee beg the attention of the House to Mr. Donkin's evidence on the subject: Q. Are you of opinion that this apparatus may be applied to engines on board ships?—A. Yes, I think with very great advantage; it probably would require a little variation in its construction.—Q. What are the general advantages of this plan?—A. The general advantages are economy of fuel and labour, and greater safety to vessels.—Q. In what way do you consider it would contribute to greater safety?—A. Because it prevents the continual operation of feeding the fire by hand, which requires the fire doors to be opened

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every five or ten minutes; and the frequent stirring of the fire occasions a great deal of the ignited coals to fall through the grate and upon the floor, whereas in this apparatus the coals are supplied by the machine itself, the fire doors need not be opened except about twice or three times a day.—Q. Does the fire produced by this apparatus act more regularly or powerfully than the fire supplied in the ordinary way?—A. Yes it does; small portions of coals are introduced on a revolving fire-place at certain intervals, so that the fire is regularly supplied; the combustion goes on entirely at the surface, and the incombustible matter, such as the vitrified parts of the coal and the ashes, settle down upon the bars, and protect them from the action of the fire.” Your Committee have inserted in the Appendix to this Report the evidence given by Mr. Brunton, concerning these furnaces, before the Select Committee on Steam Engines, of the Session 1820.

See Appendix,
Nº 9.

Mr. Oldham, of the Bank of Ireland, has invented a plan of revolving paddles, to avoid the defects of the fixed paddles as now used. He states, that the violent action of the paddles of common wheels, in striking the water in a rough sea, is entirely removed by the use of the revolving paddles, as they enter and rise out of the water with a peculiarly soft and easy motion. The precise merits of this invention will soon be ascertained; as these new paddles are now fitted to the Waterloo Packet, which plies regularly between Dublin and Liverpool, and to the Aaron Manby iron Steam Boat, lately sent from England to Havre-de-Grace, to be used on the Seine.

Pages 222. 231.

Mr. John Gladstone, of Castle Douglas, has invented another plan of paddles. He employs a pair of wheels at each side of the vessel, having two endless chains acting on them, with paddles fixed on these chains; and so far as the plan has been tried, on a very small scale, it has been successful. Several attempts have been made to get rid of the use of external wheels but hitherto without success.

Mr. Field has invented a flexible metallic piston, which has proved of great utility.

Your Committee have endeavoured to avoid all partiality in the arrangement they have made of the Evidence under separate heads, and in their observations upon it; their object has been to bring as concisely as it was practicable, under the notice of the House, all the prominent advantages and defects belonging to the actual state of Steam Navigation at sea; with the opinions of the most scientific professional men upon the best means of improving it. If the frequent reference to the performances of the Post Office Holyhead Packets should give rise to an impression that Your Committee consider them superior to other Steam Boats, Your Committee desire it to be understood that they do not think any comparison can be fairly made between these vessels and any hitherto built by private companies. In the first place, the funds for constructing them being the public money, admitted of a scale of expense that private companies could not be expected to incur; and, in the next place, those vessels were built for voyages to be commenced at a fixed hour every day in the year, across a sea exposed to strong tides and heavy gales; that is, for a duty entirely different from the duty of common Packets. From the description which has been given to Your Committee of the new Liverpool Steam Boats, the St. Patrick and St. George, the Committee are led to expect that these vessels will prove superior to the Holyhead Packets, if they have been built of equal strength, in consequence of the great power of their engines, each being provided with two fifty-five-horse engines.

The merit of first applying Steam Engines to Sea Navigation is certainly due to the skill and enterprise of the Engineers and Shipbuilders of the Clyde;

Clyde; for it was, unquestionably, the success of their Steam Boats on the Holyhead station which led the Post Office to establish their Boats for keeping up the communication between the two countries. At the same time it is but justice to say, that the public are greatly indebted to the Post Office for having exercised such a sound judgment in directing their vessels to be built of that great strength, which has been so often mentioned in this Report; and which at the same time that it has been the cause of their complete success, has also established a new principle of certainty and security in the system of Steam Navigation.

IV. SAILS.

It does not appear to Your Committee that there is any probability, at present, of applying sails to Steam Boats in any more effectual way than they are now used. Captain Rogers says, "they assist a vessel very much; that they can be used at all times, except within four points of the wind, and that they serve to keep the vessel steady." He recommends a large lug sail forward, a jib and fore and aft mainsail; to have a square topsail on board, and a gaff topsail aft; with means of setting a topmast, but not to use it unless the engine was out of order. Several plans have been tried for getting the wheels out of gear, and for moving the paddle boards from the extremity of the wheels towards the centre, and some of them successfully. By these means, a vessel, in case the engine cannot be used, may be sufficiently well managed with the sails, as to carry her safely into port. The evidence of all the other witnesses goes to show, that any attempt to carry canvass beyond a certain moderate quantity will be attended with a great impediment to the steaming power.

THE great importance of a thorough acquaintance with every thing belonging to Steam Navigation, for securing a certain and rapid conveyance of the public correspondence, where seas are to be crossed, has induced Your Committee to take this general view of the whole subject as a preparatory step to coming to that part of the order of the House which requires your Committee to examine into the conveyance of His Majesty's Mails between Holyhead and Howth.

Your Committee consider the information which has been given by so many distinguished practical engineers and shipbuilders, as extremely valuable, and that every praise is due to them for the readiness and zeal with which they have contributed to render the inquiry of Your Committee of general utility. Not only the Post Office, but all private companies engaged in Steam Boats, may obtain great assistance from opinions derived from such extensive sources of science and experiment; at the same time that the public will be benefited by those various improvements which they suggest, and which will be the natural consequences of the persevering efforts of the great talents which distinguish these professions in Great Britain.

Your Committee, in expressing their opinion in respect to the proper establishment of Steam Boats at Holyhead, concur decidedly with the great majority of the witnesses who say, that not less than four Steam Boats ought to be employed on this service. They recommend, that the vessels should be built of very strong timbers, put together, filled in and diagonally fastened according to Sir Robert Seppings's plan; and that they should be coppered and copper fastened throughout. They approve very much of the plan of a Steam Boat as described by Messrs. Maudslay and Field, who say, "a Steam Vessel and Engine to encounter a gale that would bring a stout Frigate under her double reefed topsails, or a good Cutter under

under a three reefed mainsail, should be a vessel of about two hundred tons; both vessel and machinery exceedingly strong; her form, under water, that of the fastest schooner; the centre of gravity kept as low as possible; the projecting works on the sides added to the proper body of the vessel; the rigging to strike completely; the chimney formed to cut the wind; with two fifty-horse engines every way proportioned to the strength of the vessel." Your Committee conceive the evidence, which has been given before them, removes all doubts in respect to the practicability of putting engines of this power in a vessel of 200 tons.

Your Committee are of opinion, that every part of an engine for a Holyhead Steam Boat, should be made of wrought iron, except where there is no risk of breaking, and should be effectually proved before using it, by a proper proving machine; that the boilers should be made of copper; and that the air pump, buckets, rods, and valves, should be made of copper or brass.

Your Committee particularly recommend, as indispensably necessary for economy as well as safety, according to the opinions of all the witnesses who were examined to this point, that a professional engineer should be employed to reside constantly at Holyhead, to superintend the machinery and inspect the engine-keepers. And also that each vessel should be supplied with an extinguishing fire engine, and with two large boats in addition to the ordinary ship's boat.

From the great advantages which may be derived from revolving furnaces, Your Committee feel anxious that a proper experiment should be tried to ascertain whether they can be used in place of the common fire-places.

Your Committee consider the fares charged for the Holyhead passage much too high, and they are fully convinced that a much greater revenue would be obtained if they were reduced. The following Table shows the fares now taken, and the fares which Your Committee propose to be charged in future.

Appendix, N^o 3.

	Present Fares.			Proposed Fares.		
	£.	s.	d.	£.	s.	d.
Cabin passengers and female servants -	1	5	-	-	15	-
Deck Passengers - - - -	-	-	-	-	7	6
Foremast passengers - - - -	-	5	-	-	3	-
Children under 10 years of age -	-	12	6	-	7	6
Men servants - - - - -	-	12	6	-	5	-
A coach, barouche or landau - -	3	5	-	1	1	-
Shipping ditto - - - - -	-	10	6	-	2	6
A chaise - - - - -	2	10	-	-	15	-
Shipping ditto - - - - -	-	10	6	-	2	6
A two-wheeled carriage - - - -	1	10	-	-	10	6
Shipping ditto - - - - -	-	5	-	-	2	-
A horse - - - - -	1	10	-	-	10	6
Shipping ditto - - - - -	-	5	-	-	2	-

The passengers to pay the steward, and to be at liberty to refuse to pay shipping-money in case of any misconduct of the sailors. The sailors to receive the shipping-money. The charge for shipping-money to include for shipping and landing each article.

As Sailing Packets must still be occasionally employed, Your Committee are of opinion that their equipment and condition should be as complete as they were formerly; and that any person wishing to hire a Sailing Packet may be allowed to have one on paying ten guineas, or the regular rates, if they would exceed that sum.

The

The Committee of 1819, in their Fifth Report, particularly noticed the searching of passengers luggage, and stated their opinion in the following words: "Your Committee strongly recommend, that the Lords Commissioners of the Treasury should issue orders to the Commissioners of the English and Irish Customs, to make arrangements for discharging the luggage of passengers on board the Packets immediately after their arrival at Howth and Holyhead, without opening it; provided a certificate is signed by the owner of it, that it contains no goods subject to duty; except in such cases where a just cause may appear to the officers to lead them to suppose that the luggage contains contraband goods." It appears that no measures have been taken in consequence of the recommendation of that Committee, but that all luggage is carried from the Packets by the Custom House boatmen to the Custom Houses, and there searched. At Holyhead the luggage is carried, by the boatmen, from the Custom House to the hotels, for which they charge at the rate of one shilling for each trunk or portmanteau, and for small parcels sixpence and three pence per parcel.

See App. p. 205.

Your Committee are desirous to express, in the strongest manner, their entire concurrence in the opinion of the Committee of 1819. They conceive it to be nearly impossible that the interests of the revenue could be injured by any contraband dealings. The proposed certificate would be a sufficient control over all persons who were mere travellers, and the right of the officer to search, being continued in all cases of suspicion, would afford ample means of detection in case of premeditated fraud.

But if this vexatious practice of opening every portmanteau, travelling-bag and dressing-case, shall still be considered by the Customs departments to be of such paramount importance to the interests of the revenue, Your Committee see no reason why the luggage should not be discharged on board the Packets. The size of the Steam Packets affords sufficient space for this business. The cabins are larger than the Custom House rooms either at Holyhead or Howth, and, in fine weather, the deck would allow of arrangements for the most effectual examination of the luggage.

Your Committee have been informed that the Custom House boatmen at Holyhead do not conform to the charges stated in the return of the Custom House, but demand one shilling for each parcel, however small it may be. It is certainly a convenience to the public, so long as the present system exists of searching luggage at the Custom House, to have it brought there, and from thence to the inns, by the Custom House boatmen; but their charges should be clearly defined and published, so that it may be known what is right to be given to them. Considering how great the number of packages is that must go through their hands, sixpence for each trunk or portmanteau, and three pence for every other parcel, would be a very ample allowance for carrying them from the Packet to the Custom House; and as much more if they carry them to the Hotels.

It appears from the evidence of Captain Rogers, that the new Pier Harbours of Holyhead and Howth afford ample accommodation to the Packets. Fenders, and a better arrangement of the cranes, are still wanting at Holyhead. A vote having passed this Session for building a Graving Dock at Holyhead, this Harbour is likely to be complete as a Packet Station. The Breakwater proposed by the late Mr. Rennie to be constructed at Ireland's Eye, to protect the Harbour of Howth, has not been built: the strong opinion he always expressed of the utility of it, makes it particularly deserving of attention.

As the Boards of Commissioners, who were appointed by Parliament to superintend the construction of the Harbours of Holyhead and Howth, have now nearly fulfilled their duties ; and as no Legislative regulations exist to provide for maintaining these works in proper repair, Your Committee are of opinion that a Bill should be brought in next Session for placing them under the same management that prevails at other Harbours.

As also the labours of the Commissioners appointed by Parliament for the improvement of the Holyhead Road, and for building the bridges over the Menai Strait and the River Conway, are drawing to a close, and as those works, which have cost so much public money, will require some permanent superintendence to preserve them from decay, it appears to Your Committee, that one Board should be formed out of the existing Boards for the management and maintaining of all these works, to have as the Chairman, of it the first Commissioner of Woods and Forests ; and to be enabled to levy some small duties on Vessels frequenting the Harbours of Holyhead and Howth, in order to form a fund for the expenses which will be unavoidable in preserving them from decay.

It appears from the evidence of Sir Edward Lees, the Secretary of the Irish Post Office, that the various improvements suggested by the Committee of 1819, in respect to the Letters passing between England and Ireland, and other matters, have been adopted by the Irish Postmasters General. But Your Committee have been very much surprised to find, that one of the new regulations, which related to the conveyance of English letters from and to Dublin on Sundays, has been partially rescinded. The public have derived the greatest accommodation from removing the very unjustifiable detention of the letters for twenty-four hours in Dublin, according to the old practice ; and Your Committee can see nothing like a reason, founded upon any principles of official consistency, or of an equal and fair distribution of the public correspondence, to warrant a measure that may save at most 350*l.* a-year, while it must be attended with very great public inconvenience. In place of thus limiting the operation of the Sunday Mails, Your Committee are of opinion that it ought to be extended, and that all the Cross Posts should carry the Sunday letters as well as the regular Mail Coaches.

Your Committee are informed that there is great delay in delivering the English letters in Dublin after their arrival there, and that it would be an accommodation to the public to extend the hour of delivery later in the evening than it now is, and to receive letters for England till a quarter before seven o'clock in the morning. It would be of great use to have a gun provided at Howth, similar to that on the Stack Rock at Holyhead, to assist the Packets in making the Harbour in dark weather.

12 June 1822.

MINUTES OF EVIDENCE.

<i>George Henry Freeling, Esq.</i> - p. 133 & 138.	<i>Mr. Bryan Donkin</i> - pp. 164. 168 & 196.
<i>Captain Rogers</i> - pp. 139, 143, 147 & 157.	<i>Mr. Marc J. Brunel</i> - - - - p. 175.
<i>Mr. James Brown</i> - - - pp. 147 & 160.	<i>Mr. William Evans</i> - - - - p. 178.
<i>Captain John Percy</i> - - - - p. 151.	<i>Sir Isaac Coffin, Bart.</i> - - - - p. 179.
<i>Mr. Joshua Field</i> - - pp. 152, 186 & 196.	<i>Mr. Michael Faraday</i> - pp. 180 & 189.
<i>Mr. Timothy Bramah</i> - - - - p. 158.	<i>Charles Williams, Esq.</i> - - - - p. 183.
<i>Sir Edward Lees</i> - - - - p. 162.	<i>Mr. Alexander Galloway</i> - - - - p. 187.

Jovis, 21^o die Martij, 1822.

SIR HENRY PARNELL, BARONET,

IN THE CHAIR.

George Henry Freeling, Esquire, called in; and Examined.

THE Holyhead Steam Packets have been principally under your management?—They have.

*G. H. Freeling,
Esq.*

(21 March.)

Be so good as to state to the Committee, generally, the course of proceedings which have taken place for introducing the use of steam vessels upon the Holyhead station.

—The Postmasters General have been obliged to purchase all the sailing packets, and to clear the station for the introduction of those vessels; the object was, at first, to make the steam auxiliary to the sailing packets, but we found that the steam packets could do even more than the sailing packets, consequently we keep two sailing vessels as auxiliary to the steam.

How many steam packets have you employed?—We have three altogether, exclusive of the Tartar.

Be good enough to name them and describe them.—The Royal Sovereign of 210 tons, and the Meteor of 190; the Sovereign is fitted with two engines of forty-horse power each, and the Meteor with two engines of thirty-horse power; they were both constructed by Boulton and Watt.

Where were the vessels built?—In the river Thames, by a person of the name of Evans, at Rotherhithe.

Were they built purposely of any particular strength?—They were built on purpose for the service, under the inspection of the officers of the Navy Board; they were built upon Sir Robert Seppings's principle of the diagonal fastening, and made particularly strong.

What is the third steam vessel?—The third is the *Ivanhoe*, which was formerly on the Holyhead station as a private vessel.

What is her tonnage?—165; the power of the engines fifty-six.

Is she as strongly constructed as the others?—No.

Was she used by the former proprietors for winter voyages?—She has been out in very bad weather, but has not been run the whole winter.

What has been the general effect of the experiment, in regard to maintaining a communication between the two countries?—The intercourse has been very much facilitated; it is now almost reduced to a certainty. In the year preceding the introduction of the steam vessels, a hundred mails exactly arrived in London after they were due, and in the nine months that the steam vessels have been running since May last, there have been twenty-two only.

Those nine months include the winter months?—Yes; when we have had much worse weather than the year preceding. The paper I have before me will more fully explain this.

[The witness delivered in the paper, which was read as follows:]

“From the Return made to the Order of the Committee on Holyhead Roads, of the number of voyages performed by the *Sovereign* and *Meteor*, it appears,

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appears, that in a period of 265 days to the 20th February last, they have made 205 passages only.

"The remaining 60 days may be thus accounted for;—

The Talbot was on duty	-	-	-	16 days.
The Ivanhoe	-	-	-	6 -
The Tartar	-	-	-	8 -

"In 30 instances no steam packet left Holyhead, in 11 of these whilst the steam packets were under repair the mails were dispatched by sailing vessels, which effected the passage, in four instances, in time for the departure of the coaches from Dublin.

"In the other 19 instances, the weather prevented any vessel from putting to sea, or forced the steam packets back after having put out.

"Twenty-five mails have been brought from Ireland by sailing packets.

"The steam packets have been too late for the Liverpool mail in about 40 instances, and the London mail has been out of course in 22 cases only."

How was the weather this winter at Holyhead, as compared with other winters?—I understand that the weather, the beginning of the winter, was worse than has been known for more than sixty years. We have proof that the steam packets will go to sea in weather when sailing packets could not have gone to sea; the captains have always considered that it would not be prudent to go to sea, if they were obliged to be under a three-reefed mainsail, and the steam packets have gone out in weather in which the sailing packets would have been obliged to be so.

Were they able in those cases to make their passages in a reasonable space of time?—Yes; the longest passage, I think, was seventeen hours and twenty minutes.

Was that in a gale of wind, with the wind adverse?—Yes, decidedly.

What was the shortest passage?—Five hours and thirty minutes.

What is the average of the passages of the Sovereign from Howth to Holyhead?—Six hours and fifty-seven minutes, and the Meteor seven hours and four minutes and a fraction. To Howth, the Sovereign seven hours thirty-six minutes and a quarter, the Meteor eight hours and thirteen minutes: the shortest passage was from Howth, five hours and thirty minutes.

Do the steam packets sail at all times from Holyhead, notwithstanding a bad gale of wind?—Sometimes the weather is so bad they cannot venture to put out.

By what regulation is the point determined, whether the packet shall go to sea or not?—The captain reports to the agent, and if the agent is not satisfied, his instructions are to send out another captain in charge of the packet, if he will go; if both refuse to go, nothing of course can be done. There are three or four instances in which they have put out, and found they had not head-way, and of course it was better to come back than to attempt the passage.

Do they usually steer in the face of the wind?—The best point for a steam vessel, in very bad weather, is directly head to wind; both wheels can then act at the same time. The captains sometimes keep the vessel away, when it is blowing very strong, two or three points; then, when they get on the opposite coast, they will take in their sails, and steam to the harbour in smoother water.

Do you not conceive that the success of those two vessels, the Sovereign and the Meteor, is very much to be attributed to the superior manner in which they were constructed?—Decidedly.

Do you think any steam vessels, you are acquainted with, could have gone through the same difficulties that they successfully encountered?—I have attempted to gain some information about every steam vessel which has been built, and I am convinced those vessels will do what no other vessel can do; they will go to sea in weather when nothing else can. I attribute that not only to the machinery, but to the weight of the hull; a lighter vessel in a heavy sea would be checked, but those vessels have from their weight a momentum so great, that it carries them on when a lighter vessel would have been checked; the weight acts as a fly-wheel.

The weight they have arises from the great quantity of timber and copper used in the construction?—They are filled in solid, and they are nothing but masses of wood and copper.

To what height are they built solid on the sides?—I cannot state that.

In speaking of the tonnage of those vessels, do you mean the tonnage of the vessel estimated according to the rules applicable to other vessels, or the cargo these steam vessels are capable of actually carrying?—On the rules applicable to common and ordinary vessels.

Those

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Those vessels are coppered and copper-fastened?—Yes.

Every thing has been done to render them as secure and strong as possible?—Certainly; I have the authority of Mr. Lang of the Navy Board for stating that, with the exception of the discovery ships, there are no vessels so strong.

Is it your opinion that three packets are a sufficient number for maintaining the communication between Holyhead and Dublin, so that two shall sail every day?—Yes.

What is the arrangement with respect to allowing sufficient time for looking over the engines and keeping them in repair?—With the view that there might be a sufficient time allowed for looking over the machinery and the vessels, it was arranged that they should each be six days at sea and three days in harbour, which affords ample time for inspecting the machinery; that has been fixed in a great measure with reference to the engineers themselves, who stated that that time was more than sufficient for it.

Under whose care are the engines?—Under the charge of the engineers. When the packets were first established, as it was at so great a distance from London, we wanted men, not merely practical engineers, but having a greater portion of science than men of that description generally have, we were obliged to give very high wages, but we got certainly the two best men there were; we were obliged to buy them out of their situations in the River, one for each of those two vessels, the Meteor and the Sovereign. As the *Ivanhoe* might perhaps be merely a temporary vessel, we got the engineer who was with her from Liverpool, but of course we shall obtain the best engineer to be procured when a third packet is regularly established.

Each engineer has charge of his own engine?—Yes.

In what manner is the packet commanded?—There are four captains, who take it in turn; there being three vessels, each has charge of the vessel going the six days in turn, and once in a month the captains go off duty for eight days—the fourth allows a relief.

Is the engineer under the command of the captain?—Yes; certainly.

How many men are there on board each?—At present, as there are only two vessels, there are sixteen men on board each; as the work is very severe, there being only two vessels running every day, the complement for them, when a third is upon the station, is fifteen for the *Sovereign*, being the larger vessel, fourteen for the *Meteor*, and fourteen for the *Ivanhoe*.

What work do you allude to?—The going to sea every day, and clearing the boilers, and putting the vessels in proper order.

What time does that take after each voyage?—It takes a good while in the whole, as the boiler must be allowed to cool; the cold air must not be let in; it was found to crystallize the salt and injure the boilers, and we were obliged to cease doing that.

The seamen have not much spare time after a long voyage before the commencement of a fresh voyage?—In moderate weather they have.

There have been some accidents to the engines?—Yes, there have; but I hope that will be prevented in future; it was, I think, I may say almost entirely, to be attributed to the use of cast iron; the cross bars and the beams were of cast iron, and if any water was in the cylinder at starting, the check caused the cast iron to break; we have now got them made of wrought iron, but the lower beams of the engines, which are very large, are still of cast iron; there must be some part of the engine left to give way in case of any emergency, which is better than destroying the cylinder.

Have you altered those parts which were faulty?—Yes.

Since that there have been no accidents?—There has been one I think.

There was an accident in the summer with a beam?—Yes; they were of cast iron and hollow, since that we have got solid shafts of malleable iron.

Are the sails sufficient to navigate the vessels in case the engines fail?—Scarcely; there is sufficient to do it in case of emergency, but we have been trying experiments on the Dover station with different sorts of sails, and we find lug sails are more powerful than any others, and we have now sent down lug sails for the Holyhead packets instead of their fore and aft sails.

Is there any prospect of their being effectual to enable a packet to beat to windward?—A packet is so large a vessel it would not enable her perhaps to fetch to windward, but she would be able to reach some port, but there being two engines they can be disconnected, and one worked without the other; it has happened that a packet has proceeded using one engine only.

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That is in case the main shaft does not break?—Yes.

You mentioned that the vessels were exposed to injury from Holyhead Harbour being so crowded; how has it been in the course of the last winter?—It has been frequently very much crowded; some time since two large brigs broke adrift in the harbour, and got foul of two of the steam packets; they did not do any very great injury.

It happens frequently in a gale of wind, that a great number of vessels come into harbour at Holyhead?—Yes, a very great number.

More than the size of the harbour is able on the sudden to accommodate?—Yes.

Have you any accommodation yet in the way of a graving dock?—No, I wish we had; it would be a very great object indeed for our service if there were to be a graving dock at Holyhead; at present they must go either to Liverpool or Milford; and Boulton and Watt, who furnish the machinery, are very anxious we should not go to Liverpool in case of accident, lest their competitors there should obtain possession of some of their machinery.

You have two sailing packets?—Yes; one stationed on each side.

Do they change?—They go across occasionally, once a week or a fortnight.

Are they commanded by a regular captain?—No, the mate is in charge; the mates who are selected for that are the most respectable men in the service.

What crew have they?—The sailing packet at Howth is fully manned; I think there are nine persons on board, including the mate.

Do they carry the mails?—Yes, when there is no steam packet; that at Holyhead has only four men as her regular complement, because we can always get enough people on a sudden to man her completely to go over.

Do they cross the Channel on any fixed days?—No; there are no fixed days.

Can any person hire a sailing packet that pleases?—It has never been made a question of; but it would be an object not to let them go lest an accident should happen to the steam packet expected next day; if there were three steam packets I conceive there might be no difficulty in allowing any person to hire one of them at Holyhead.

You have mentioned that there are only two steam packets at present that have been built particularly for the Holyhead service, the Meteor and the Sovereign; is it intended to build a third so as to make up your complement of three?—The Postmasters General have long had under consideration the building a third vessel, but when the *Ivanhoe* was purchased they wished to have a proof of what she could do before they began to build; they do not expect that the *Ivanhoe* will be found sufficient to run in the winter, and I believe measures have been taken for building a third vessel specially for the service, as far as regards obtaining plans and estimates.

Do you look forward to any improvements in constructing the new one?—I think the shape of the vessel can be improved to give her more velocity.

Which of the two is reckoned the best, the Sovereign or the Meteor?—It is hardly possible to draw a fair comparison, one of them having twenty-horse power more than the other; the bow of the Sovereign is infinitely superior to the bow of the Meteor, but the quarter of the Meteor is much better than the quarter of the Sovereign; if we could take the bow of the Sovereign and the quarter of the Meteor we should make a perfect vessel.

Has the experiment led you to expect that an eighty-horse power engine is preferable to a sixty?—I think the sixty-horse is preferable if the vessel is built a little finer with a foot less breadth; a good engine with a sixty-horse power would drive that vessel as fast as the Sovereign with her eighty.

What would be the effect with regard to heavy seas and bad weather?—She would be equally calculated for the bad weather. We find of the Sovereign and Meteor, the Sovereign is the best vessel going head to wind from her power; but in blowing weather with canvas, the Meteor is certainly superior. When we were going round to Holyhead from the River, we had some very bad weather off Beachy Head, and while the Sovereign was labouring in a sea, both under canvas, the Meteor shot by us; I thought she would have been down upon our deck; almost when we got round the Lands End, the weather was so extremely bad that we had hardly head-way, and we thought we should have been driven up to Bristol, fortunately the wind moderated and we were able to get into Milford. We were so anxious to get round the vessels, that the Meteor left the River in a very incomplete state; we had shipped several people in the river Thames who were sick and useless, and when we came to the very worst there were only four people on board the Meteor

Meteor who could stand on their legs; considering all circumstances this could scarcely be taken as a fair trial, but on the whole the Meteor did as well as the Sovereign.

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Both vessels put into Milford?—Yes. The Postmaster General, I believe, have some idea of trying whether what are called Scotch engines may not be better for a third vessel, in case of one being built; they are more simple though perhaps not quite so efficient, not so liable to derangement, and are consequently better for a heavy sea; and if the vessel is properly built, I do not think there can be any great difference in the rate of speed.

Inform the Committee in what the principal difference consists between the Scotch engines and Mr. Watt's?—I am not able to answer that question.

Is there not a difference in the paddles?—Yes, there is a difference in the way of fastening the paddles; we have tried the principle of the Scotch wheel at Dover, with machinery of Boulton and Watt, but we do not find it makes any material difference.

Have any of the Scotch vessels gone through the winter?—I believe not; the Rob Roy has been running occasionally between Dover and Calais in the winter.

You have a post-office steam packet between Dover and Calais?—Yes, two.

Have they gone through the winter?—One of them has gone through the winter, the other has only lately gone round; but from their draught of water, and the difficulties of the harbour on each side, Calais and Dover being dry harbours, and their not being able to run into them at all times, the captains have not thought it prudent to go in such weather as the Holyhead packets have put to sea in.

Are they built on the same principles as the Holyhead?—The wheels of one are not upon the first motion; they are spur-wheels, but we find that will not do for sea-way, the crank is so much more simple.

Has any thing been done to assist the packets at Holyhead to get into harbour in bad weather?—A gun has been sent to the South Stack, and each of the steam packets is supplied with one, that in foggy weather, if they do not exactly know where they are, they can fire and the man at the South Stack answers them.

Is there the same arrangement at Howth?—I believe not.

You have tried an experiment at Holyhead, with an engine upon an entirely new construction, in the Tartar packet?—We have.

What has been the result of that experiment?—I must first say that the inventor has not carried into effect every thing he intended, therefore the trial may be said to have been made while she was in an incomplete state. The Tartar, as an experiment for our Holyhead service, has entirely failed; indeed Mr. Broderip admits she is not calculated for the Holyhead station; his object was to make the machinery auxiliary to a sailing vessel, that she should have all the properties of sailing with the power of applying machinery if the wind was contrary.

Then the failure has been more owing to the attempt of connecting the sailing power with the steam than any failure in the principle of the engine?—The engine is faulty in part certainly.

What is the postage on a letter from London to Dublin?—Fifteen pence.

What part of that is for crossing the Channel between Holyhead and Howth?—Two pence.

What is the postage from London to Holyhead?—Thirteen pence.

Might not a vessel, constructed with all the properties of sailing, with the Sovereign's bow and the Meteor's quarter, have a steam engine put into her, and answer as well as the Meteor or the Sovereign?—Certainly, as far as the hull is concerned; the object is velocity through the water, whether the vessel be propelled by machinery or by canvas.

Are the boilers in those Holyhead packets high pressure or low pressure?—Low pressure. Mr. Watt, I believe, was the inventor of the original high pressure engine, but afterwards abandoned it on account of the danger.

No cases of late have happened of accident from the bursting of boilers?—Not that I am aware of.

The bursting of the boilers in either of those two packets would interfere with the action of the steam engine, but would not be attended with dangerous consequences to the crew?—The boiler would not burst, it would rend or open.

There could be no explosion?—No.

That arises from its being made of wrought iron?—Yes.

What precautions are taken to prevent accidents by fire on board the post-office steam packets?—There is a greater space; the engineers can get round the boilers

and

G. H. Freeling.
Esq.

(21 March.)

and under them and over them; in addition to the outer case round the bottom of that part of the funnel which is near the deck there is a third iron flanch which comes from the funnel to the deck.

What number of boats is there in each packet?—There is only one on board at present.

It having been observed that the boat was on the deck, was that the proper place for her?—No; the proper place is hanging from the stern—there are davits for the purpose there.

Under whose care are the ladders at Holyhead from which the passengers embark or disembark from the packets?—I believe the commissioners of the pier.

How many feet at low water is it from the top of the pier to the deck of the packet?—Fifteen or sixteen feet, I think.

What description of ladder is made use of?—It is a very indifferent ladder; it is in my opinion scarcely safe.

Jovis, 28^o die Martij, 1822.

George Henry Freeling, Esq. again called in; and Examined.

(28 March.)

ARE there any alterations or additions you wish to make in the evidence which you gave on a former day?—I wish to explain some parts of it as to the steam packets, in addition to the securities I mentioned against fire; we do not put any fuel or coals over the boiler, which was the cause of the Robert Bruce catching fire and being burnt. They used to stow their wood and fuel over the boiler, which became ignited in some way; it never is done with us, it is positively forbidden.

Where are they stowed?—In cases made for the purpose in the engine-room.

Are the cases lined with iron?—They are iron cases. The other point was as to the *Ivanhoe*. I was asked whether she was so strong as the other vessels; the answer was simply, "No." But she is not three years old; she was inspected at Liverpool a short time ago, and I think she is as strong as any of the steam vessels except those on the Holyhead station.

Was any thing done to her to make her stronger?—She was inspected and made as strong as possible under our direction.

What timber is she built of?—Fir.

Then it is the difference arising from the different state of the two sorts of timber?—Yes; and the difference of her filling in; she is not filled in as the others are.

Besides that is there a difference in the timber?—Yes.

Do you look upon it that the superior strength of the oak counterbalances the weight?—I think the weight is a great advantage. A question was also asked as to the practice of begging for money. I have ascertained that there is certainly no instance of the packet seamen having done this at all. There are men who were formerly in the packet service who attend as porters on shore, and being out of employment follow passengers and ask them for money.

You do not now allude to the steward?—I now allude merely to the sailors.

Is there any code of regulations as affecting the passengers delivered from the post-office?—There is no written code of regulations.

What accommodation is there on board the Royal Sovereign as to births?—There are twenty altogether.

How many rooms are there?—Two; one for ladies and one for gentlemen.

How many births are there for ladies?—Six.

The cabin appropriated to gentlemen is fitted up with sofas?—There are two sofas.

Is there any rule or regulation which prevents ladies going into that cabin if they find it convenient?—None whatever; but we rather wish to keep the after-cabin distinct for ladies, because when they are in bed they do not wish strangers to be there, but we find it impossible to do that. Gentlemen going over with ladies say, "keep me out if you dare; my sister, daughter or wife is there, I will go in to take care of them."

Is there any regulation that if a lady was to wish for a pillow to support her in her carriage that she could not have it?—I have never understood so; there is a regulation that the stewards shall not bring the beds upon deck; we have had a great number of beds spoiled from being brought upon deck in bad weather.

Captain William Rogers, called in; and Examined.

You are the commander of one of the Holyhead packets?—I am.

Be so good as to acquaint the Committee in what manner the communication has been kept open between Holyhead and Dublin by the steam packets, and what has been the success of the experiment of establishing them on that station.—We have done every thing that could be done by steam boats, and they will go no doubt when a sailing vessel will not; that has been proved.

Have they fully answered the expectations you had formed of them?—Fully so; they have exceeded my expectations.

Have you had full trial of the steam packets with respect to gales of wind?—Yes, in every way; I crossed in the Meteor on the 5th of February, in the heaviest sea I have seen during the eight years I have been on the station.

Have the steam packets sailed regularly the whole winter?—Except a very few days; I have seen them go several times when the sailing packets could not.

What have you considered to be the sort of weather when you say the sailing packets could not go?—I went in the Meteor on the 5th of February, when no sailing packet could carry canvas, they must have laid to; I left at nine at night, and arrived at six the next morning.

Was it blowing in the way you describe at the time of your leaving Holyhead?—Yes.

The sailing packet would not have attempted, under the same circumstances, to have gone to sea?—No one could have gone.

How came you to sail at nine o'clock at night?—There were two mails on board; the Tartar put back with the mail, and I took her bags.

In what point was the wind?—South-west and by south; no sailing vessel would have got under weigh at the time; the Chichester sailing packet came over the same day from Howth, with a three-reefed mainsail, storm jib, and could not bear a foresail, and it blew harder when we started.

How long was the Chichester coming over?—About seven or eight hours.

Why did you go at nine at night?—To prove what steam would do.

The Tartar had put back, and you had taken the mail she could not take?—Yes.

Are you not perfectly satisfied, from the experience you have had, that the steam vessel you command is capable of performing what no sailing vessel can do?—Yes.

You mean the steam vessels built for the Holyhead station?—Yes.

Have you not often left Holyhead, during the winter, when no sailing vessel could get out?—We have.

Have you discovered that the steam vessels, built under the inspection of the Navy Board, are as safe as any vessel you ever navigated?—Certainly.

Is there any danger, in your opinion, to be apprehended from them as steam vessels?—No.

In what way is your safety provided for in the shape of valves?—We have safety valves, but I cannot say how many pounds to the square inch.

If at any period the fire should elevate the steam to such a pitch, has not the engine the power of relieving itself?—It has.

Have you observed that, in crossing the Channel with an adverse wind, you accomplished your passage under easier circumstances than you could possibly do in a sailing vessel, inasmuch as you were enabled to go head to wind?—Yes, much easier.

Do you find that a steam vessel is capable of making her passage much sooner, under all circumstances, than a sailing vessel?—Yes, in one half of the time upon the average.

With the wind at W.N.W. blowing hard, and leaving Holyhead in a gale of wind, you have found a steam vessel has been much easier than a sailing vessel?—Yes, their extreme length overcomes the short sea.

Do you, with such wind, steer your course direct?—That depends on the weight of the sea and state of the tide. It is a general rule with me, when the vessel will steam from three knots to three and half, and the vessel not labouring much, to make a straight course; if otherwise, to sail her until I smoothen the water, then down all sail and steam right for the port.

Have you found in blowing weather that the vessel works at all either inside or out?—No, not at all; I do not see it in the least, not a single thing, she is as solid as a wall.

*Captain
William Rogers.*
(28 March)

*Captain
William Rogers.*

(28 March.)

What do you attribute that principally to?—To the diagonal works, and to the mode of fastening.

Have you tried the coal tar?—Yes.

How long have you used it?—Ever since she has been built.

What is the longest time you have ever been on the passage?—Fifteen hours is the longest I have been.

Do you conceive that any improvement can be made in the construction of a steam boat should a new one be ordered?—Yes; I think we could make improvements.

State what they are.—I do not think too fine a vessel will do; when she is so very fine she will not answer in those seas; the bow of the Meteor is too full and the Sovereign's quarter is too heavy.

What improvement could you suggest to the Committee to do away that?—In building a steam boat she ought to have a fine entrance and her bow to clear off, not to shove any water before her; any water she shoves before her must be an impediment to the sailing; she should have a fine entrance, a good line of bearing, and her transom pretty square, and not too high; the more you can stop a vessel from pitching and rolling the quicker she will go; I found with regard to the Scotch boats that all their transoms were too high and too narrow, the consequence of which is, that with a head sea they go with their stern under; I have seen them go boat and every thing under; the transom being square and low and fine under, so as to give them a right line of bearing, will stop their pitching and rolling and make them easy on the sea and add to their speed.

You attended the building of these two vessels, the Meteor and the Sovereign, in the river?—Yes, I did.

Describe generally the cause of their great strength.—They are filled up solid to the floor-head, caulked inside and out, having no tree nails, but bolted and copper nailed. The bolts are driven upon a ring and clenched at both ends.

Have you Spanish heads?—Yes; then there is the diagonal fastening.

Describe what that is.—The diagonal fastening is a plank three inches thick fore and aft, three and a half thick midships, and nine wide leading from the floor-head to the shelf, taking in five or six timbers; and then it is filled by truss pieces into triangles, so that it is almost impossible that the form of the vessel can alter.

Have not these vessels proved themselves decidedly superior to any other steam vessels?—We have never seen any other steam vessels that would go with them; they are very superior to any others in strength, safety and speed.

Have you examined many steam vessels?—I have been on board several; the Majestic, the Superb, the Ivanhoe, and the Talbot, and many others in London river.

Have you sailed in any of them?—Yes, in the Superb and the Majestic from Greenock to Liverpool; Talbot and Ivanhoe from Howth to Holyhead.

Did you go to Greenock for the purpose of inspecting the steam vessels?—Yes.

Did you see and examine those other vessels previous to the building of the two Holyhead packets?—Yes.

Have any other steam vessels navigated and kept at sea all the winter?—None. The Majestic and the Superb had some difficulty in making their passages last October, and were laid up for the winter. I remarked on board the Majestic when I was in her that she was very tender.

Very crank?—Yes, very crank.

If you were consulted with respect to building a new vessel, what other alterations would you propose besides those you have mentioned with regard to the bow and the stern?—Their main beams might be put closer to the wheel, and their boiler placed lower, and the engines nearer together and more in the centre.

The engines on board those vessels were made by Boulton and Watt?—Yes.

Have you seen the Scotch engines?—Yes, I have.

Are you able to inform the Committee which engine is best?—I should prefer Boulton and Watt's engine to any other; their boilers are very superior, and never short of steam. Boulton and Watt had been accustomed to vessels for rivers, and the engines were made rather too slight for our Channel; the shaft was hollow, and of cast iron, but they have been replaced by solid shafts.

Have those vessels ever been disabled except when they broke their shafts?—They have broken their cross-heads, which are soon replaced. I broke two, and they were replaced immediately; the cross-head of the piston, and the cross-head of the air-pump, which were replaced with wrought iron spare ones on board.

Were those replaced at sea?—Yes; we stopped one engine and worked the other with the wind right a-head, and in five hours the engine was repaired and worked.

There

*Captain
William Rogers.*

(28 March.)

There is a difference of opinion between wrought iron cross-heads and cast iron; they say it is better for the cross-heads to break than any thing worse, which is the beams, or the top of the cylinder to be knocked off.

Then, in point of fact, since the month of May last, when these two vessels were put upon the Holyhead station, they have never been disabled, except in those two instances when the shafts broke?—No; and then they could have made their passage.

You are able always to keep one engine at work out of the two, unless the shaft fails?—Yes; you may always work one engine, unless the shaft breaks. The shaft is the only part common to both engines, and therefore unless the shaft is broken, the two engines are not disabled.

Comparing the Meteor and the Sovereign with any other steam boats you have seen, are they not infinitely superior both in construction and safety?—Yes; and in speed.

In a gale of wind?—Yes.

Have you ever exhausted your fuel?—Never half.

Do these engines consume much less fuel than the engines of other vessels you have been on board?—I should think less than half.

What is the rate of consumption by the hour?—We use about eight hundred weight in the Sovereign per hour; in the Talbot and Ivanhoe they each consume about fourteen hundred weight.

What does the Meteor consume?—About five hundred weight.

What are the respective powers of the Sovereign and the Meteor?—The Sovereign has two forties, and the Meteor two thirties.

Do you find the Sovereign a superior vessel in consequence of this increase of power?—Yes, in going head to wind; but there is a great deal owing to the Meteor's bows; she will not go head to wind.

Which vessel would you prefer in a gale of wind?—I think the Meteor is the best boat in a gale of wind.

Generally speaking, would you prefer an eighty to a sixty horse power in a gale of wind?—No; but I think the Sovereign is rather overpowered; if you were to put two forties in her again you must put in much heavier engines. The advantage the Sovereign has over the Meteor is going head to wind, but the Meteor will beat her with her canvas. The Sovereign's canvas steadies her and lightens the engine, but does not much help her speed.

Supposing you were choosing your own vessel, what plan would you prefer?—I think you might build the vessel a little smaller for two thirties; if we were to build for two forties we must build a larger vessel than the Sovereign, and she is full large for the station.

What size would be the best size for vessels for the station, and what power?—I think the Meteor is very near the size, with the improvements we could make upon her.

Under all the circumstances of your passages, have you not found the motion of the steam boat much easier than the sailing vessel?—Yes; it is not to be compared to it.

In a gale of wind have you found the passengers complain of the motion?—Yes, they do complain of the vibration; passengers frequently complain on board the steam packets that they were never sick before, but I do not pay much attention to that, for the last passage is always the worst.

In what degree are you able to take advantage of sails in bringing them to aid the steam power of the vessel?—Sails assist the vessel very much; we use them every way, except going head to wind, within four points of the wind.

Do you find them assist considerably in the speed of the vessel?—I have found the Sovereign go as fast in a calm as at any other time. It must not be thought that a steam boat running before the wind in a gale and a heavy sea, that she ought to make the quickest passage, as we are then obliged to shut off half the steam, or great part of it; for should you allow the full power to be on, the wheels running two or three times round without touching any thing between the trough of the sea, and then being brought up all at once, something will probably give way.

And by thus moderating the steam there is no fear?—No; the engine goes as easy as a glove.

Do the sails serve to steady the motion?—Yes; they steady her certainly.

Do you not make just as good a passage with a foul wind as a fair wind?—In a light air of wind we do not mind going head to wind, and smooth water.

*Captain
William Rogers.*

(28 March.)

Supposing the engines to be out of order when at sea, so as not to be able to use them, have you sails enough to enable you to command the vessel?—Yes. The other day when I hove the Meteor to I stopped the engine, and we were going three knots and a half with the lee wheel nearly under water; we were sounding; it was very heavy weather.

Have you the power of putting the wheels out of gear?—You may unconnect them from the engine and let them run round, or take your floats off; but we cannot do that when the engine is going.

When you broke your shaft what did you do?—I was not on board her then, but I towed her back; I met her about seven leagues from Howth, and towed her back to Holyhead.

How was the wind blowing?—South-south-east, fair for Howth.

Do you think she could have got on with the sails?—Yes, and made her passage; but as the mail was sent away by a schooner to Howth, it was better to tow her back, as Holyhead was the only place to repair her.

A shaft has been broken twice?—Yes, twice; once in the other boat.

What was done in the other case?—She was towed back.

Supposing dark weather to come on, the wind blowing hard from the Irish shore, so that you could not have made the land, could you have laid to or sailed the vessel?—Yes, we could have sailed the vessel or have come to an anchor; by putting two cables together which she has on board, she would ride out any gale in the Channel as easy as a glove.

You are of opinion that in the event of the engine failing, with the assistance of sails and the anchor you may always keep the packet in perfect safety?—There is no doubt of it.

In the event of any accident happening to the steam apparatus with a lee shore, what power have you, by sails, of keeping off that lee shore?—I cannot see where there is a lee shore, it must be either over at Dublin or at Holyhead; and if it is a lee shore, then it is a fair wind back.

Have you ever been in such a situation, since you have commanded those packets on a lee shore, that you could not take the tide under your lee bow on one tack or the other?—Never.

Have these packets the same power to go to windward as a common merchant vessel?—Yes, and they will beat a common merchant vessel in sailing.

Have any improvements been made lately to give steam packets more power of canvas?—Yes, there have been.

Explain what they are.—Three more cloths are put in the mainsail, and a very large fore lug; the after one remains a schooner sail.

Will you be obliged to carry more ballast in consequence?—No, we are as stiff as churches; we take out 12 tons of coal in the summer; there are 60 hours coal on board.

Upon the whole, with the nature of the Channel, the shores, and the power of the canvas you can put upon a steam packet, with the aid of anchors and cables, you feel perfectly secure at all times, though the engine may go out of order?—Yes.

Has it ever occurred to you to lay to for a night at anchor?—No, we never should lay to any where.

Have the packets ever been out a whole night, starting in the morning?—Never; one o'clock in the morning is the latest they have been out; you cannot lay to in a tide way, or ought not so to do; we do not want it; the people get more used to steam vessels now; we can hit the land at any time now, either the hill at Howth, or Holyhead light-house.

Have you guns on board for signals?—Yes, a six-pounder each.

There is a gun at the Stack?—Yes, there is.

Have you found it of any use as yet?—We have had no use for it as yet; we shall want it in the summer, I dare say; I have not the least doubt we shall find it of great service.

Is there any gun at Howth?—No; there are some on the round towers.

Not to assist the packets?—No.

From the superior construction of the Meteor, and the Sovereign having their timbers filled in and caulked, in the event of getting on shore and knocking the keel off, or the planks off the bottom, still the vessel might be saved?—Yes, certainly; there is a very great difference of opinion as to filling vessels in that way.

Have you found those two vessels equally buoyant with any other you have sailed in?—Yes.

Has

Has the great weight of the timbers and materials diminished their speed?—No, I think it rather gives them speed against a sea.

Then the inconvenience anticipated from the mode of constructing these vessels has not taken place?—No, it has not.

Are the Committee to understand your opinion to be, that in any weather, however severe, the steam boats will stand that weather as well as any sail boat?—Yes, in any wind; the more wind the better for the steam boats; that is where they show their superiority.

In the heaviest gale that could blow you would rather be in a steam packet than in a sailing packet?—Yes; that is in a vessel of our own construction.

Captain
William Rogers.
(28 March.)

Sabbati, 30^e die Martij, 1822.

Captain William Rogers again called in; and Examined.

BE so good as to give the Committee an account of your voyage from the River round to Holyhead.—On the 16th of May, blowing hard from the S.W. 3. P.M. I left Gravesend on board the Sovereign, in company with the Meteor steam packet, with seven or eight men on board of each. At 9 anchored in the Downs, blowing very hard; she rode very easy with thirty-five fathom cable in five fathoms water. On Thursday the 18th fresh gales from W.S.W. 5. A.M. weighed anchor and steamed for Portsmouth; wind dead on end. 4. P.M. made the Owers Light; hazy weather. 9. P.M. very heavy gales and thick weather. I asked the engineer what coals he had on board, he told me five hours; we were then obliged to steam in for the land. At 10 made the Nab Light upon the starboard quarter, about a quarter of a mile; shortened steam for the Meteor to come up. At eleven anchored at St. Helen's in six fathoms water, with forty fathom cable; hard gale. On the 19th, 3.30. A.M. weighed anchor and ran into Portsmouth harbour; made fast to one of the buoys alongside His Majesty's ship the Queen Charlotte; then we were employed in getting coals in, and very bad they were. At 4.20. got under weigh and steamed out of the harbour, and at 9 passed through the Needles against a flood tide. This day was fine weather, and light airs from the N.W. At 1.30. P.M. anchored in Falmouth harbour; there we remained a week to clean the boilers, to caulk the decks, and so on. Sailed from Falmouth the 26th, wind N.W. fresh gales. At 5.30. passed the Longships Lights. At 9 in a squall, with heavy rain, the wind shifted to the N.N.E. blowing very heavy and a heavy sea, the vessels going from three knots to three and a half, head to wind, blowing hard. At 7 made Lundy Island, bearing E. by S. passed several vessels lying to; passed a large smack, lying to, under close reefed mainsail. At 8 made sail upon the vessel; stood more to the southward into the Bristol Channel, to smoothen the water. At noon more moderate; water smoother; down all sails and steamed for Milford. At 5 anchored in Milford, found several vessels had been out in the gale and obliged to put back; the vessels that had been put back, bound to Liverpool, said they had never experienced worse weather before for many years. On Sunday evening the wind more moderate, and from N. to N.E. At 8 P.M. got under weigh. On Monday, at 4 P.M. arrived at Holyhead.

(30 March.)

How many days were you performing this voyage?—Five days, with the wind right a-head down the English Channel and up the Irish.

During that period could any square rigged vessel, from a first-rate down to a sloop of war, have performed the voyage you did in the time you did in the steam boat?—No; it was impossible. In the Downs we passed several Indiamen, and 150 sail there that could not move down Channel, and at the back of Dungeness we passed 120 more.

During that period how did your vessel behave herself, under the circumstances of bad weather and adverse winds?—Nothing could be better; but she rolled a little, and which I think we can cure her of.

What improvement could you suggest to prevent her rolling?—I should take a foot off her beam in the first place, and make her bottom not quite so round, and the engines placed nearer together, and her wheels not quite so wide on the side; they are eight feet wide.

In a gale of wind on a lee shore, do you not think them much safer vessels than any square rigged vessels?—Yes, most certainly; because they can use their steam as well as their sails.

Be so good as to describe to the Committee the exact improvement you would recommend

Captain
William Rogers.
(30 March.)

recommend as to the construction of a new steam vessel.—I should make her a foot narrower, and raise her floor-heads a little, take off the roundings, with her engines put nearer the centre, the boilers much lower, and the wheels narrower: I have observed in our vessels with these wide wheels, the lee wheel is a great deal under the water, and the other out; by the width of them it increases the angle; and although a wide wheel is of great advantage in a river, I think it is a great disadvantage in a sea; supposing there were two forty-horse power engines, I would not have more than a seven-foot wheel; ours is an eight-foot wheel, and if there were two thirty-horse power, six and a half, in my opinion, would be sufficient.

Would those wheels have power to give the packets the same speed they have at present?—Yes; we might lose twenty minutes in a calm, but we should gain two or three hours in a gale of wind; that has been tried in this river by the *James Watt*; her paddles are nine feet wide, and with one half of them on, four and a half in length, she was found to go nearly nine knots, and she only goes ten with the whole on; but I must observe, that after you get a vessel to go nine knots, it takes a great addition of power to make her go the tenth.

As to the form and shape of the *Meteor* and *Sovereign*, what improvement would you recommend in a new vessel?—I should recommend it to be a little finer and eighteen inches narrower than the *Sovereign*, and a foot narrower than the *Meteor*.

What alteration would you propose with regard to the bows?—Much finer than either of them.

Have you sufficient experience of the Scotch engines as to be able to give a decided opinion in favour of the engines made by Mr. Watt?—No, I have not yet. I have been in the Scotch vessels several times, and I have seen their steam go down; in one of them the vessel was nearly on shore; it was the *Majestic*; she was entering the narrow passage going into Liverpool, and they let the steam go down; she was nearly on shore in consequence; unless you are constantly firing you can never keep the steam up.

Has that ever happened on board the Holyhead packets?—No; never.

On building a new vessel, would you recommend Watt's engine to be made use of?—Yes, I would, for my own part.

Can you suggest any improvements?—I should make the engine much stronger.

In what respect?—In every part.

What effects have you observed, when on board the Scotch vessels, from the engines?—I have seen fire going up the chimney, and I have seen sparks of fire flying over the deck; there must be a great waste of fuel in consequence; we never see that on board our vessels; they come out dearer, but they are cheaper in the end.

At the time you performed that voyage, with the weather you have described, from the Downs to Milford, if that weather had continued twelve months, would any square rigged vessel have performed it?—They would have been a long time about it, probably would have been weeks instead of days; a sailing vessel would not have beat up to Milford as we did in twelve months.

What parts of the engine give way most frequently?—The cross-heads at the top of the piston. If the engineer is not very careful, and allows them to get too hot, you may carry away a cross-head, or if water is allowed to get in the piston, which it does sometimes, being too hot. I think there will be an improvement in that before long.

What time ought to be allowed, in your opinion, for looking over a steam engine in order to keep the vessel as much at sea as circumstances will admit of?—Two or three days. An engine should never lie by longer, because if she was to lie by in the harbour, you would have to set the engine going to keep it in order.

Does it require three days to give an engine a complete looking over?—No; two days, or a day, or two or three hours; it is according to what is to be done to her.

What number of days may a vessel sail, day after day, without a thorough examination?—They might run a week, fortnight or longer, but once a week it would be necessary to examine them.

You recommend she should lie by two or three days, and be examined?—Yes.

Then, on the Holyhead station, it being necessary to send a packet to sea every morning from Holyhead, and another from Howth, in order that the vessels may be kept in order, how many vessels, in your opinion, should be maintained to do the service?—I think you might do it with three, and very easy, with a sailing vessel on the other side; then a vessel would be lying by three days and running six.

With those arrangements of lying by three days and being at sea six, three vessels would

would just exactly perform the service, and no more?—No more would be required; they would perform the service; nor is it necessary they should lie by three days.

Supposing they sailed six days and laid by three, there would be no day on which they were not at sea or lying by for the necessary time for examination and repairs?—It does not follow that they would want repairs.

Supposing they do lie by three days and are at sea six, it occupies the whole time; there is no spare time?—The spare time would be the three days.

If each packet is at sea six days, and if she lies by after every six days for three days, she would actually upon no occasion lie by more than three days?—Certainly not, unless there is anything particular to do to them.

Three packets would just perform the service, and nothing more?—Yes.

But upon a press a vessel would go eight days instead of six?—Yes, we have gone all the winter and summer with two.

Since the Meteor and Sovereign have been at Holyhead, have they not been continually at sea?—Yes.

How many men are there on board?—Fifteen.

What work have the men to do after the packet arrives at either side?—They get the coals in, and clean her.

What time does that take?—About a couple of hours with horses and carriages.

Have you not made many voyages in succession in gales of wind?—Yes, many.

Coming in late after a gale of wind, and having to sail early in the morning, do not the men go through a great deal of hardship while the weather continues bad?—Yes, but they have their night's rest; if a man be in a sailing vessel, and should be on deck two or three nights, he would soon find the difference to a steam vessel.

Do you not think the work is as hard on board the steam packets as the sailing packets?—Certainly not, as regards myself.

As to the men?—Nor as to the men; if a man complains of a steam boat, he must be afraid, or something of that kind. I never read a novel before I was on board a steam packet, and I go down now frequently and read for an hour or two; if a man works hard in the day, he has his night's rest, and a man is never better than when he does his day's work; I have not the anxiety now which I used to have, being up night after night.

In what way is it decided whether a packet shall go to sea in case of very bad weather?—By the commander and the agent.

What is considered to be weather to keep a steam packet from going to sea?—There may be a difference of opinion upon that; when it is a downright hurricane, and it is impossible for any vessel to stem ahead, we do not attempt it.

Do they go out when the cutters cannot?—Yes, with the wind at N.N.W. which is the very worst wind we have.

Do you go out when a sailing vessel would not?—We have made many passages when a sailing packet would not go out.

Were there many gales from the N.W. last winter?—Yes, several.

Has it been a worse winter than usual?—I have heard it said, that it has been the worst winter for fifty years. Lloyd's have paid more this winter than ever they did.

Have the gales been from the S.W.?—Yes, S.W. and W.S.W. and that generally finishes with a N.W. wind.

Have you had many from the eastward?—No, only one gale.

Which do you reckon the worst gale?—I think meeting with an easterly gale is the worst; there is always a heavy sea upon the shore, the gale does not last so long, but leaves a very disagreeable short sea. Many times after an easterly gale, we have been two days beating over in a sailing packet, which a steam vessel will perform in eight or nine hours.

Have you ever sailed in a heavy easterly gale from Howth in a steam packet?—No, I have not; the Meteor, Captain Davies, entered Howth harbour with a very heavy gale from the eastward, when the Marquis Wellesley went over, and she went in very easy. It was the heaviest sea that had been seen for many years.

Has the harbour at Holyhead been crowded very much with vessels?—Very much; I have seen 120 or 130 vessels there.

Have you experienced much difficulty in getting in or out with the packets?—No; but the Sovereign has suffered some damage with vessels driving upon her.

Is the harbour large enough for the number of vessels that have recourse to it in bad weather?—No, I do not think it is.

Is it not the practice frequently for the Liverpool vessels to run in?—Yes; but when

Captain
William Rogers.
(30 March.)

*Captain
William Rogers.*
(30 March.)

when Dunleary is finished, I am of opinion that will be the out port of that Channel. There have been several instances of vessels leaving Holyhead, and have gone there to wait for a wind, which have made their passage out of the Channel, whilst the vessels at Holyhead have still been wind-bound.

Have you found any difficulty in bad weather in getting the packets into Howth harbour?—Never.

Have they ever touched ground there?—Very seldom. They are deepening it in the west pier.

Have any of the vessels been damaged by touching?—No; the sailing vessels used to be.

Are there any inconveniences in landing passengers and carriages at the pier at Holyhead?—Not passengers, but carriages. I have seen Sir Colin Campbell's carriage detained on board the Sovereign for twelve hours for want of a crane being in the proper place.

Where is the crane?—Half the pier up one of them is, and the other is down in the jetty.

Where would you propose to put the crane?—About 120 feet from the jetty. There are no fenders, and we run a very great risk of breaking the wheels or destroying the engine, for want of them; no longer back than last Sunday, we nearly met with a very serious accident, by striking the foundation stones at low water; I did hear before Mr. Rennie died, there were orders given for them, but have not heard a word about them since.

Are the cranes in a proper situation at Howth?—Yes; they have got two, and a third, a temporary one.

Where are they placed?—One on the west jetty, one abreast of the Custom-house, and one on the east pier.

Are there fenders at Howth?—There is every thing complete there.

Would not an extension of the harbour at Holyhead, so as to admit the Liverpool traders to come in, be of considerable value and importance?—O! yes.

Have the East and West Indiamen any port to run into between Milford and Liverpool?—No; Holyhead might be made one.

In case of an accident in the Channel, where must they go to repair?—Liverpool.

Is there a sufficient depth of water for forming a pier at Holyhead, so as to make it a harbour for the general trade?—Yes; between the point of the salt island and the present pier, there is a large rock, which would be a good place to run a pier from, with plenty of water to take any vessel.

And such a pier would give perfect protection to the largest vessels that come in?—Yes.

How long would such a pier be?—Half the length of the other.

In what manner are horses put on board?—Either by boxes or slings.

Is there a box always at hand?—Yes, one on each side.

What sort of accommodation is there on board for horses in the steam vessels?—The fore-hold will contain six horses.

What floor is there?—It is a wooden floor and it is battened; a horse would find his feet better upon ballast, but you cannot put ballast there, for if a horse was to kick some of the stones into the engine, it would spoil the engine.

How many sailing packets are kept in addition to the steam boats?—Two.

Do they sail every week?—No, they are changed monthly; there is the Chichester and the Felham.

Supposing the sailing packets were to sail one from each side on particular days might not this give a better accommodation for the carriage of horses?—No; nor will people go in them.

Is the *Ivanhoe* built sufficiently strong to stand the winter season at Holyhead?—She is not so strong as ours, but she is as strong as other vessels in general.

Is she strong enough to go through the regular service of the station at Holyhead?—While she is new she is; she would not run long.

Is she made of fir or oak?—Fir.

What precautions have been taken on board the *Meteor* and *Sovereign* to prevent accidents from fire in the arrangement of the furnaces and boilers?—There is water all round them, and they are kept three feet from the bottom, about fifteen inches from the side, and twelve inches from the deck; we are differently constructed from others, and it is quite impossible that any accident can happen, there is water under and on the sides of the fire places; in those boats that are fitted up upon the Clyde there is nothing but brick and mortar below the furnaces, we have iron.

Martis, 2^o die Aprilis, 1822.

Captain William Rogers again called in; and Examined.

*Captain
William Rogers.*
(2 April.)

IN the event of building a new steam packet, what improvements would you suggest in respect to the build, the engine, the sails, and to the interior arrangement of her?—I think I should build her in the same manner as the others are built, on Sir Robert Seppings's plan as to mode of fastening, diagonal fastening, &c. &c. only a little finer at each end, and one foot narrower than the *Sovereign* and *Meteor*, to be 95 feet in the keel, 105 or 106 upon deck, and 19 feet in the beam, about 180 tons, her transoms square, and not very high out of the water. The improvements in the engine would be to make them a little stronger, and the boilers a little longer, keeping them more from the side of the vessel, so that the heat might not affect her, and more room to go round them, and to put the boilers lower down.

What advantage would you get by putting them lower?—It would help to prevent their rolling. The *Talbot's* boilers are a little higher than the *Ivanhoe*; by putting the *Ivanhoe's* lower down, found she did not roll near as much. I would have the two main beams put close to the wheel, which will reduce the weight very much and strengthen and make the vessel much easier, as by being so far asunder adds great weight, and acts as a lever. There should be twelve paddles about seven feet long and nineteen to twenty-one inches wide. The engine should be something between sixty and eighty horse power, but this must depend upon the fineness of the vessel, and the water she will draw. If the engine is to be made much stronger, in that case we must not go further than two thirty horse power engines, as then the weight might be too much. I should recommend, with regard to the sails, a large lug forward, and a jib and a fore and aft mainsail; and in case any thing should happen to the engine, I would keep a square topsail on board, and a gaff topsail aft, but not to be used except in case of necessity.

You would also be able to set top-masts?—Yes.

Mr. James Brown called in; and Examined.

You belong to the house of Poulton and Watt?—I have been agent for them some years.

Did you put up the engines on board the *Meteor* and *Sovereign* steam packets?—I superintended their erection.

What parts of the engines most frequently fail?—We generally consider the working parts, the cross bars, the side rods, and the side beams.

To what do you attribute the cross bars having broken on board these vessels?—In some instances from want of caution on the part of the engineer, and in other cases from stress of weather.

Were they made of cast iron or malleable iron?—Hitherto of cast iron; they are now made of wrought iron for sea vessels.

Have you put engines into any other vessels?—We have put engines into most of the vessels on the river Thames, the Dover station and Leith.

Have accidents happened frequently to those vessels?—Upon the Leith station one or two cross bars have broken, and that was entirely from want of caution on the part of the engineer in starting the engine; the other vessels were the *Dasher* and *Arrow* on the Dover station; there was one accident of a cross bar breaking in the *Dasher*.

Was that from want of caution?—I cannot say that.

Have accidents happened to vessels in the river?—In the first instance there were three or four little breakages, but subsequently they have gone on very well.

Has any other part of the engines of the Holyhead packets failed?—A shaft was broken, I think the crank shaft.

Was it made of cast iron?—Yes; and I believe its failure was attributed to there having been some screws drilled into the shaft to fasten on the risings for eccentric circles, it was considered that these wounded the shaft, as it broke up that part.

Have the side beams failed?—They are called side beams or main levers.

Have any of them failed?—Only one in the *Meteor*.

Is that made of cast metal?—Yes.

Mr.
James Brown.

(2 April.)

What would be the effect of making the whole engine as strong as possible, by using nothing but malleable iron?—I do not conceive you could make an engine without being liable to break; there are some parts so small that they must give way, and it is better the most insignificant parts should fail, than some of the principal ones, because they are easier repaired.

Is an engine liable to that extraordinary pressure upon it, under particular circumstances, that it is better to have some part that would give way?—I should think so; for instance, it would be better for the cross bar to break than the side beam, and if not either of those two, that some of the cutters or straps of the side rod should go.

You mean that it would be more easy to repair?—Yes; but if the engine-man sees any thing going wrong he has only to let off the steam.

Can those repairs be made at sea?—Not well; but there are generally duplicates on board of those parts liable to accident. You could not well straighten the bent parts of wrought iron at sea.

In case of constructing a new engine for a Holyhead packet, can you suggest any improvements?—Merely in respect to making the materials stronger and heavier. I conceive the construction of the engine is almost incapable of improvement as it now is.

Would you make any alteration in the arrangement of the boilers?—It would be better to lower the whole machinery together, bring the engines nearer the centre of the vessel, and let the boiler rest upon the keelson.

Would you require more room than was allowed in the *Sovereign* and *Meteor*?—Yes; it would be better we should get round the boilers entirely, they could then be painted every month, which would be a great advantage, for the action of the salt water is very detrimental to the iron; they ought to be painted every three weeks, or every month; where a boiler will not leak with fresh water it will with salt water; and it forms incrustation upon the surface by exposure to the atmosphere; they should be pumped out, and frequently cleaned.

How long would it take to paint a boiler?—Half a day.

What number of voyages may an engine go, supposing the distance to be each voyage twenty leagues, without looking over and making a thorough examination of it?—I should think the engineer generally looks over his engine every morning before he starts, to see that every part is properly oiled, and that every screw and joint is tight. If so inspected, once a fortnight would be sufficient to examine the packings of the slides and pistons.

Supposing the vessel to finish her voyage late in the evening, and go to sea again early in the morning, would it not be necessary to lay her by occasionally to examine her?—I think it would be an advantage to the service to have a spare vessel to perform the duty while repairs were being done to the others, and overhauling the machinery.

Would it not contribute to the preservation of the machinery to have that overhauling take place at particular periods after a certain number of voyages?—Certainly.

What time would it take to overhaul an engine completely, to ascertain whether it was in any respect injured?—If there were no repairs to do I should think two days would overhaul all the packings about it, even doing it leisurely; if exertion was required it might be done in half the time.

Would you make the paddles for a new engine different from those put to the Holyhead packets?—We should make them the same as for the Leith vessels, they are made with wooden floats in one piece, having three sets of arms, and the bolts are of a peculiar description, which allows the paddles to slip from the outer end of the arm towards the centre of the shaft, by which means a vessel may use her sails the same as any other vessel; should any thing give way, there would be nothing but the arms in the water.

What time would it take to get rid of the paddles?—There would be only four or five to get rid of; the four topmast paddles would be slackened, and fall towards the centre of each wheel, the wheels would then be turned round, and the bare arms would be in the water.

How would you steady the wheels to enable the men to work upon the paddles?—By lashing the wheels fore and aft with tackles.

Have you not some contrivance for engines at work on shore, so that if they become exposed to any sudden violence, they stop themselves?—Pumping engines have.

Have you been able to apply the same principle to engines on board vessels?—

I do

I do not conceive that could be well done so as to act of itself; the engine-man should take the steam off, and disengage the eccentric, when he sees any accident likely to occur.

Mr.
James Brown.

(2 April.)

Is it not for want of some such precaution that many of the accidents have happened?—Perhaps in some cases it may be so, but I should apprehend it depended more upon the engineer than any thing else; he should never quit the engine room.

What circumstance is it that chiefly occasions that sort of excessive violence which contributes to injure and break the engine?—Any of the working parts getting loose, any of the screws getting between the finer parts, or the water getting upon the top of the piston in starting the engine.

In what way can the water get upon the top of the piston?—It is from the condensed steam that forms from the boilers after the passage is over, it gets through the steam pipe to the cylinder and condenses there, perhaps to the depth of 18 inches on the top of the piston, and if the engine is started suddenly without it being cleared away, it has not time to get through the thoroughfares.

What is the consequence?—The consequence is, that it is jammed between the top of the piston and the under side of the cylinder cover, and risks the breakage of some part; as water will not compress, something must give way, and the weaker parts of course will go first.

Is the City of Edinburgh steam vessel employed to go from London to Leith?—She went there during last season.

For what months?—I think on the 24th of June I first went with her.

When did she stop?—I cannot say positively, I think the beginning or middle of October.

Was she exposed to many gales of wind?—Her first passage was extremely rough, we were eighty-four hours making the passage.

What is the shortest time she made the passage in?—I think fifty-eight hours.

What is the distance?—We reckon it 450 miles, and I believe that is near it.

Do you take enough coal with you?—Yes, they have a sufficient supply in the coal boxes, and for a third of the passage more.

Why did she not continue to go through the winter?—I suppose she would not have paid, she is a large vessel of 400 tons.

Was she strong enough?—She was built at Blackwall yard, and that is quite enough to say she was sufficiently strong; the floor timbers were about 12 inches square.

What was her tonnage?—401 tons, the length upon deck 143 feet, and 14 feet depth in the hold.

Is she of a similar construction to the Holyhead packets?—She has not the diagonal timbers; she is built the same as other merchant vessels.

What precautions have been taken in the arrangement of the furnaces on board the Holyhead packets, to prevent accidents from fire?—I hardly think it is possible that fire can take place, because the furnaces are completely surrounded with five inches of water round every part, and it is only in raking out the fire, and neglecting to water it, that any accident can take place; it is raked out upon an iron floor.

No rolling of the vessel could throw the fire about?—No; she must be pitching to a great degree, if that was to take place.

How are the coals carried?—They are in boxes in front of the boilers, so as to be right and left for the fireman.

Are those boxes cased with iron?—They are made of iron entirely.

Can a body of water be let in from above, in case of an accident by fire from neglect?—No; but there is a hand pump in the engine room to be used when they are filling the boilers, and they can get water enough from that; in the new Leith packets we have put jet pipes, the same as fire engines have.

Could you put these jet pipes on board the Holyhead packets?—Nothing could be easier.

What are the precautions taken to prevent accidents from boilers bursting? I can hardly conceive on board these vessels, where condensing engines are used, that it is possible that such a thing could take place; they are generally provided with two safety valves, and the steam used is about from two and a half to three pounds pressure upon a square inch, at which pressure it blows off by the safety valve of its own accord.

How are those safety valves arranged, so as to be at all times operative?—Boulton and

Mr.
James Brown.
(2 April.)

and Watt have made them for many years in the way they now are, inaccessible for any person to load them by putting additional weight upon them; I have seen the Scotch engine men, in starting their engines, place their feet upon the safety valve.

Suppose by any accident the safety valve was out of order, and the pressure became too great for the strength of the boiler, and it was to give way, what would be the effect on the boiler?—Supposing such a thing, which I conceive is impossible, that the safety valves should get choked, the steam would come off at the feed pipes.

It would not give way under any circumstance?—No, not even though the valves were choked, the pressure is so extremely small; the boilers are calculated to sustain fifty times the pressure required of them.

If any part of the boiler, by length of use, became very thin, and gave way, would it fly or rend?—Merely rend, if malleable iron.

Were not the accidents that happened from boilers, sometime ago, owing to their being made on the high pressure principle, and being made of cast iron?—Yes, they were.

When made of cast iron, and the pressure too high, they gave way, and the metal flew?—Yes, just like a shell.

Malleable iron tears and rends?—Yes.

Without flying and doing injury?—Yes.

Have Boulton and Watt made any improvement in their engine since the Holyhead packets were built last year?—Not that I am aware of, the principle remains the same as it was when it left the late Mr. Watt's hands; the construction of the engines has not varied since the Meteor and Sovereign were built; they have made them stronger and added malleable iron in parts where cast was used.

Those were the first vessels that had engines for the sea from Boulton and Watt?—Yes, they were, and they are the first vessels that ever ran all the winter.

What quantity of fuel do they consume?—I think the experiments made in the river with the Meteor showed that she consumed about seven bushels per hour, rather under, she was then working above her full speed; the Sovereign I think was from nine and a quarter to nine and a half; the Meteor has two thirty horse engines, and the Sovereign two forty horse engines; the latter when using that quantity of coal was going about nine miles and three quarters through the water per hour.

What time does this give for each ton of coal for the Meteor?—A bushel of good Newcastle coals is reckoned equal to a hundred weight of Scotch coal; so that it comes to very nearly the same thing; the Scotch coal generally burns very free and so does the Staffordshire, but the bushel of Newcastle coal is equal to a hundred weight of either.

Do you know the proportions of the Whitehaven coal to the Newcastle or Staffordshire?—No, I have no certain knowledge whereby I could speak of it.

What is the ordinary weight of the bushel of Newcastle coals?—The standard bushel should weigh eighty-eight pounds; the best Walls End, I have found them eighty; and the Wylam, seventy-seven; I found that by actual weight the specific gravity of the Wylam coal is much under that of the Walls End, the latter is not good for working engines.

What description of coals is the best for those engines?—The best coal we have been able to meet with is the Halbeath or Inverkeithing, from a place in Fife called Inverkeithing.

What is the peculiar quality of them?—Burning free and becoming a complete white ash without caking upon the fire bars.

Is it necessary to have a coal that ignites very quick?—Yes, if it does not cake afterwards. It is a great object to get good coals. In the first passage that I went with the City of Edinburgh from London to Leith, the coals were very indifferent, and we were obliged to clear the fire every four hours.

Did you take the fires out?—Yes, took them out one by one completely; in coming back we had a description of coal called Halbeath Main, and with them went sixteen hours without cleaning the grates; the sulphur in coals will destroy the fire bars in a short time.

Do you find any inconvenience from salt forming in the boilers?—Yes, when the main hole cover is taken off and they are exposed to the atmosphere, the water then becomes crystallized and renders them very difficult to clean.

Has this been avoided by any plan?—Yes, by constructing pumps or cocks to let the water through the side of the ship without the main hole being opened.

Does

Does that prevent the crystallization?—Yes, quite.

Has the salt water much effect upon the boilers?—It oxidates the iron very rapidly indeed, if it is allowed to lie upon it.

What period will a boiler last, supposing it constantly in use?—On board a steam vessel, I should think from four to five years with care; it is the only part of the machinery subject to decay.

These engines, upon the whole, require a considerable degree of care and superintendence, and skilful engineers?—They certainly do require more care than the land engines; every engine requires great care.

Captain John Percy called in; and Examined.

You command a steam packet on the river?—Yes, from London to Margate; the Hero.

Have you commanded any other vessel?—Yes, the Victory, belonging to the same company; I commanded the Victory for three years; the Hero was built last year.

Do you go through a good deal of sea occasionally?—Yes, off the Margate sands, when it is blowing from the northward and eastward on the top of the tide, she being such a large vessel, feels it more.

What is the tonnage of the Hero?—427 tons.

What is the power of her engine?—Two engines of fifty-horse power.

Who are the engines made by?—Murray and Fenton, of Leeds.

Where was the vessel built?—At Rochester.

What months in the year have you been running these vessels?—We begin about the latter end of April and run into October, about the middle of October; I have run into November in one year, the 14th of November.

What engines had you on board the Victory?—Two twenty-fives.

By whom made?—Mr. Dickson, of Holland-street, Blackfriars.

Are you acquainted with Boulton and Watt's engines?—We have not any one in our concern; I am acquainted with vessels that run with them, and I rather think they are the best; they have not had so many accidents as we have.

What sort of accidents do you allude to?—First, the cross-heads in the Hero went away twice in the last season, and several of the bolts and the steam pipe went; now we have got copper ones in the room of cast iron.

From your experience in conducting those vessels, can you suggest any improvement that can be made in them, in respect of the engine or the vessel?—In respect of the vessel, we should improve if we had but half the projection work; in consequence of their being such an immense hang over, it jars so, enough to shake the vessel to pieces.

In respect of the engine, can you suggest any improvement?—Not as to the engine; as to the boilers, we never find ours last more than two years.

What part gives way first?—The bottom.

What quantity of coal does the Hero consume an hour?—Pretty well three quarters of a chaldron or twenty-seven bushels, London measure, per hour; in general, they make away with six chaldron in the passage, that is owing to the want of flues; we have not flues enough; we have four furnaces; it is owing to an error in our burners, that we burn so many coals.

What is the distance from London to Margate?—About eighty-four miles.

At what rate do you commonly go?—We generally make the passage in about seven hours and a half, that is the average passage; one passage I made in six hours and sixteen minutes, with the wind and tide.

What sails do you carry?—Very handsome lugs, fore and main lug and jib, and a square sail when it will admit of it.

You have two masts?—Yes; we used to work them with mizens, but we found they carried so much weather helm, that they did more harm than good; most of our vessels want head sail, and not aft sail.

When in heavy seas, do you find the engines work well?—They jar a good deal when they pitch.

How wide are your paddles?—Eight feet in the centre.

How many paddles have you on a wheel?—We have been trying an experiment last Saturday with twelve, and it answered very well; last summer we worked with sixteen paddles, three and a half feet between each.

Have you ever used paddles wider than eight feet, in any vessel you have been aboard?

Mr.
James Brown.

(2 April.)

Captain
John Percy.

*Captain
John Percy.*

(2 April.)

aboard?—No; I believe the *Hero* is the widest of any vessel running; the paddle of the *Victory* was five and a half in one place; the *Hero* worked more with the paddles being further apart, and we lowered them a little.

How much have you lowered them?—The *Hero* was the fastest vessel on the river; we raised them seven and a half inches, and then we were the slowest; now we have raised them four inches, and that will be about the thing.

What made you raise them?—They thought the vessel would go faster and easier.

How much do they take of the water?—About seventeen or eighteen inches.

What does your engine work up to?—Thirty strokes per minute she did on Saturday.

What is the lowest?—Twenty-two; she once did up to thirty-one, but twenty-nine and thirty is about the go.

What is the diameter of your wheels?—Fourteen feet.

Have you ever commanded a steam vessel at sea?—I have been across to Calais when His Majesty went over.

How did she perform her voyage?—Pretty well going, it was fine weather; but she worked very much coming back, it was owing to the width hanging over; she jarred so much, you would have thought the top was coming from the bottom; if it was not for that, she would be the fastest vessel in the water.

How many feet water does she draw?—Six feet four. I have not a doubt had the hang over been taken off we should have done very well. The vessel I have to contend with draws only four feet eight; in smooth water she will do very well, but in sea-way she will not do, she rolls very much from want of depth of water to check her.

Where do you carry your coals?—Close to the fire, in two iron tanks, that hold six chaldron and a half; there is a little clap-hatch at the bottom where they keep working down; we carry two stokers.

What precautions have been used to prevent accidents from fire?—There is a set of buckets on board.

What is there under the furnaces between them and the ship's timbers?—Iron plates.

Is there nothing under the iron plates?—No, that is before the furnace mouth.

What is under the bed of the furnace?—Large, stout, heavy iron plates.

Is there no brickwork?—No, none; the greatest danger is in raking the rubbish out after the passage, and not cooling the ashes. She burns such an amazing quantity of coal, and that makes the heat the more, and damage has been done to the timbers from that.

Does your vessel go out every day?—No, there is a day between each passage, one in town and one at Margate, to examine and clean the vessel. We sail from London on the Saturday and come away from Margate on the Monday, and go down on the Wednesday.

You have a day's holiday between each passage?—Yes.

Do you find that time necessary to keep the vessel in order?—Yes; we find all the time taken up; the men are never still.

How many hours, on an average, does your passage require?—About seven and a half.

How many miles an hour does that make?—Between eleven and twelve.

Sabbati, 20^o die Aprilis, 1822.

Mr. Joshua Field, called in; and Examined.

Mr. J. Field.

(20 April.)

DO you belong to the house of Messrs. Maudslay?—Yes.

Who are engineers?—Yes.

Have you constructed any engines for steam boats?—Yes, several.

What vessels were they?—The *Richmond*, the *Regent*, the *Engineer*, the *Rising Star*, the *Earl of Egremont* at Portsmouth, and several abroad; one is the *Quebec*, five hundred tons, fifty-six horse power; another a large ferry boat: these engines were sent out; they are in the river Saint Lawrence; one to Hamburg, the *Duke of Cambridge*; and one to China, to work between Canton and Macow.

Have any of the vessels you have mentioned been made use of for sea voyages?—Except in summer, to Margate, they have not been used for sea voyages. I omitted to

to mention the *Sovereign*, a vessel lately built by us, expressly for sea navigation, between Dover and Boulogne.

How long has she been built?—She has just now commenced operation, within the last three weeks.

What is the power of her engine?—Two engines of sixteen horse.

What is her tonnage?—About a hundred tons.

Has she performed many voyages?—About six.

Has she been out in any rough weather?—Yes, very.

How has she answered?—Exceedingly well.

Have any parts of the machinery given way?—Nothing more than the paddle arms; that is the only thing which has given way.

Are the materials of the engine cast iron or malleable?—Both cast and wrought.

What is the main shaft?—That is cast.

What are the cross bars?—They are wrought.

What are the side beams?—They are cast; we have made shafts and beams of wrought iron in several instances.

Why have you put a cast iron shaft into this vessel?—Because the shaft was short, and might be sufficiently large to compensate the difference between the strength of cast and wrought iron.

Would you put a cast iron shaft with engines of sixty or eighty horse power?—If a shaft is made of dimensions sufficiently great, cast iron might be safely applied.

But would not those dimensions become inconvenient from the space they would take and the weight of them?—I do not imagine they would; the weight is certainly an objection.

Do you consider, upon the whole, that cast iron is preferable to wrought iron?—If wrought iron can be depended upon to be perfectly sound in all its parts, it is unquestionably the best; but I have seen several instances wherein wrought iron shafts have broken.

What is the difficulty of forming wrought iron shafts?—The same difficulty that exists in uniting all large masses of wrought iron so as to be perfectly sound in all its parts, besides the great expense.

Is the iron subject to be injured much by the forging and heat requisite for working it?—No, it is not subject to be injured when worked with judgment; but the carelessness of workmen will sometimes make an unsound shaft or crank, which it is very difficult to detect or guard against.

Is there any method of proving the soundness of a shaft of wrought iron before it is put into use?—It might be submitted to some proof, but it is difficult to submit it to exactly the same kind of strain it is to be subject to.

Could the proof, applied to iron chain cables, be applied to the shaft?—I think such proof might, but it would require an apparatus expressly for the purpose.

Does the engine you have got in the *Sovereign* differ in any respect from those you have put into other vessels in its principle?—Not materially.

Was it made stronger for the sea, than usually made?—Rather stronger, particularly about the shafts.

Have you had an opportunity of trying the *Sovereign* packet with the new post office packets on the Dover station?—Yes.

What has been the result?—The *Sovereign* and *Dasher* ran together last Friday, and the *Sovereign* beat the *Dasher* on the passage from Dover to Boulogne, and also beat her on the passage back on Saturday.

Does the regular post office packet go to Boulogne?—No; the captain took her to Boulogne on that day, we suppose rather to try her speed with the *Sovereign*.

Did the *Sovereign* beat her by much time?—I believe about eight or nine minutes, somewhere thereabout.

Where was the *Sovereign* built?—Built at Dover, by the proprietors.

Is she built in the same way as the steam vessels are built, for use on the Thames, or built stronger?—Stronger.

Stronger than merchant vessels, or common sailing packets usually are?—No; I should not say stronger than merchant vessels usually are; she is clinker built.

How many feet of water does she draw?—Six feet two.

What is the breadth of her beam?—Sixteen feet.

What sails does she carry?—She has a jib and foresail, a mainsail and a mizen, and a square sail used before the wind.

What is the breadth of her paddles?—Five feet.

Mr. J. Field.

(20 April.)

Are they made upon any particular construction?—No, they are made of iron curved.

Can you put the wheels out of gear?—Yes, we can.

How many paddle boards have you?—Eight.

What is the diameter of the wheel?—Nine feet.

What part of the engine do you commonly find first fails?—From wear or decay the boilers; but in the engine I do not know; it is perfectly accidental.

You have had accidents with engines, of course?—Yes.

And what do you consider to be the chief cause of accidents, generally speaking; is it the stress of weather or sea, or the neglect of the engineer?—Both; some accidents have arisen from the vessel being weak, and straining the machinery in a sea; some from neglect in feeding the boilers: those accidents that happened to the boilers have chiefly arisen from carelessness in feeding the boiler, or from want of sufficiently cleaning or changing the water.

Is not the engine exposed to accidents from not clearing the water from the top of the piston?—Accidents have happened, and in some cases we have applied a valve on the cylinder lid to prevent it.

Do you think that will prevent an accident of this kind?—Yes; completely.

Under all cases?—Yes.

You have tried it in engines at sea?—Yes; we have frequently observed a considerable discharge from it, which otherwise would be compressed in the cylinder.

If that valve had not been applied, probably some accident would have happened?

—Yes; most likely.

Have you found it completely answer to protect the engine from this species of injury?—Completely.

Have you made any engines of very large power for vessels?—Seventy horse power.

What vessel has that on board?—The Engineer has an engine of seventy horse power.

Do you find she has superior speed in consequence, and upon the whole is a superior vessel in point of power?—The tonnage of her is so great that the proportion between power and resistance is not so great in her as in some other vessels.

What is her tonnage?—Three hundred and fifteen tons.

Suppose you had to provide an engine for a vessel of two hundred tons to perform sea voyages, and built with the greatest possible degree of strength, what power of engine would you put on board her?—If the object was to contend with violent winds and sea I should put as much power as the vessel would conveniently carry.

To be used on the sea and to go through the winter navigation, as for instance between Holyhead and Howth, where it is subject to great gales of wind and violent tides?—Steam boats have been built with a view to afford great accommodation to passengers, therefore the space allotted for the engine has been limited; but a vessel built expressly to carry the mail across a tempestuous sea I should imagine that nearly the whole vessel might be appropriated to the machinery.

Would you always make the power in proportion to the space you had for the engine?—It would be more advantageous to do so.

It is your opinion the greater power the better the vessel will be?—Yes, in all cases; no vessel ever had a sufficient power yet.

Are there no circumstances with respect to the weight and space which a large engine takes up, which would counteract the utility and advantage of it with regard to its power?—There is a limit, but that limit has never yet reached its fullest extent.

Suppose in a vessel of two hundred tons merely to carry mails, without any consideration of passengers, what engine would you say would be preferable to put into such a vessel?—Without determining upon the plan, it would be difficult to state the power that could be put in; but I should think in a vessel of two hundred tons two fifty horse engines might be very well placed in it, making one hundred horse power or even more.

Does the weight of the engine increase much in proportion to the increase of power?—It does not increase in direct proportion.

Could you use paddles sufficiently wide to have the full benefit of so large a power, in a vessel entirely for performing sea voyages?—I do not see any reason why.

What breadth of wheel would you propose for two fifty horse engines?—They should be eight or nine feet wide.

That

That would be a sufficient width to give the vessel the full benefit of the power?

Mr. J. Field.

—Yes.

How many paddles would you put into a wheel?—Experience has pointed out a proportion, which is generally one to every foot of diameter, or thereabouts.

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Then what diameter would you make a wheel for such a vessel and with such an engine?—About fifteen feet.

Could not two fifty horse power be placed in a vessel of 200 tons, and still leave room for thirty or forty passengers?—I think it could.

How many feet of the length of the vessel would such an engine require, including the boiler and all the apparatus?—I am speaking rather at a guess now, but it would be about forty feet.

In what part of the vessel with respect to the centre would you place the engines?—Rather before the centre; the centre of buoyancy of the vessel.

Where would you place the boiler?—Rather behind the centre of buoyancy.

And where the axle of the wheel or shaft?—The most forward part of the engine.

In what position would you place the boiler with respect to the water line of the vessel?—There we cannot do as we would; the general rule is to keep the centre of gravity of the whole as low as possible; we cannot place it lower or higher as we would; the object is to keep it as low as possible.

Are the boilers commonly placed above that line or below it?—They are below it.

Could not the boilers be so adapted by giving them greater length as to get them lower than they are usually put in steam vessels?—They may a little, but not much; I am speaking of the centre of gravity of the boilers; the bottom of the boilers should be placed as low as possible.

How low could the bottom of the boilers be placed over the keelson of a vessel?—If the boiler is formed to the shape of the vessel's bottom it may be brought down nearly on the keelson; the boiler is so formed in the *Sovereign*.

Would this contribute to lower the centre of gravity of the boiler?—It would contribute to that.

What sized boiler would you propose for two fifty horse engines?—That is a question which, to answer without calculation, is rather difficult; about twenty cubic feet to a horse power.

Is that the rule on which you make your boilers?—Yes.

Do you think it is necessary to have so large a boiler from the experience you have had with engines?—I think so; certainly.

What method have you of getting the water out of the boilers after a voyage?

—We let it run through the side to the level of the water on the outside, and then a pump throws out the remainder.

Are you able to clear it without letting in the atmospheric air?—It may be thrown out by the force of the steam, and is in some cases; otherwise the atmospheric air must be admitted.

Do you find any inconvenience in your engines by the formation of salt in the boilers after voyages?—Yes.

Have you contrived any remedy for that inconvenience?—Nothing; excepting changing the water very frequently, and affording the greatest facility for that purpose to the engine keeper.

What precautions are taken in the vessels in which you have put engines, to prevent accidents from fire?—By insulating every part in which the fire acts from the vessel by water, and that for some way up the chimney.

You mean the furnace also?—Yes.

How is the platform arranged so as to prevent the fire in the furnaces getting into contact with the timber of the vessel?—The fire places are sufficiently below the deck or wood work of the vessel to prevent any communication with the deck; and the floor is plated with iron.

Is there any other substance between this iron and the timber?—No; the radiant heat from the ash hole is not great enough to fire the timbers of the floor when well plated with iron.

Might not this iron get so hot as to communicate to the timbers below?—I should not think it is possible by mere radiation from the under side of the bars.

In case of accident, what means have you for obtaining a supply of water to put out fire?—In some cases we have an engine with a hose and branch pipe on board to apply to any part of the vessel.

Mr. J. Field.

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Where is that engine to work?—On deck.

What other arrangements have you of obtaining water on a sudden for the purpose of extinguishing fire?—We have had no other than a common pump on deck for the ship's use.

Have you had accidents from fire on board any of those vessels in which you have been concerned?—About six years ago a vessel caught fire and was consumed; it had not water round the chimney.

What vessel was that?—The Regent.

Was it on the Thames?—It was on its voyage from London to Margate; the fire was discovered under the deck over the boiler.

Is it necessary to have a good deal of room about the boiler in order to clean it?—It is advantageous to have a passage round it.

How often do they require painting?—Once in three months would be sufficient, I should imagine, but of course the oftener the better.

Is it necessary to examine the vessel very closely after each voyage?—Certainly it would.

To what extent should an examination of that kind go?—Particularly to see that the boiler is well cleaned, and that all the parts of the engine are in perfect order.

Would it be necessary to examine the packings, the slides, and piston?—I include that in the latter part of my answer.

How many voyages might a vessel go without any other examination, except the cursory examination that might take place in the interval between the two voyages?—That depends very much upon the quality of the engine; some engines would not go so long as others, without thoroughly being examined and tightening all their parts.

In order to give the engine a complete examination and to go over all its parts, so as to take care that every thing is right, what time would be necessary?—One day in a week at least.

Is a day sufficient to go over the whole?—At least a day.

Would there be much of the engine to undo?—No, not a great deal.

What quantity of fuel is burnt on board the Engineer by the hour?—I think on an experiment at which Mr. Donkin was present, I think it was somewhere about seven and a half bushels.

At what would you estimate the weight of the bushel?—Eighty-four pounds.

What coals did you make use of?—I think they were Wylam coal.

Does the new vessel, the Sovereign, you have mentioned, roll much at sea?—Very little; the centre of gravity being kept down as much as possible.

It has been generally an objection to the steam vessels that they roll a good deal at sea?—Yes; it has arisen from that cause.

Are you of opinion that an engine should be so constructed as to calculate upon some part of it breaking in case of a very great degree of pressure upon it?—If that part can be very speedily repaired there might be advantage in having a weak place.

But upon the whole, would it not be better to make an engine of the greatest possible strength so as to avoid breakages?—Certainly.

What would then be the consequence of an increased pressure upon it when an ordinary engine would give way?—It would stop.

And the steam go off by the safety valve?—The effect in that respect would be the same as stopping the engine in the ordinary way.

From your experience in constructing engines for river navigation and for sea navigation, would you make the engines much stronger for the sea than for use on a river?—I should make them stronger for both a river and for the sea, and particularly for the sea.

Then you think in no case they have hitherto been made sufficiently strong?—I think not.

Does the experience you have had in engines enable you to suggest any other alterations in the general formation of them?—I am not immediately aware of any other.

Are you making any other engine at present for any vessel?—No; we are not at present.

If you were making a new one, would you make that different from the one you put last on board the Sovereign?—No.

Captain Rogers, again called in; and Examined.

It appears from the return of the post office that the average length of voyage of the Royal Sovereign, from Holyhead to Howth, is seven hours and thirty-six minutes, and that the average length of voyage of the Meteor, from Holyhead to Howth, is eight hours and thirteen minutes; and also that the average length of the voyage of the Sovereign from Howth to Holyhead is six hours and fifty-seven minutes, and the average length of voyage of the Meteor, from Howth to Holyhead, is seven hours and four minutes; is not the difference of the voyage to be attributed to the different power of the engines?—Certainly.

In building a new packet, why then should not the power of the engine be at least eighty horse power?—In the way they are making the engine it would be very heavy; it would be more weight than the last, and we should require to have a much larger vessel, and that will do away with the power of the engine.

Do you think a vessel of 400 tons would bear an engine of eighty horse power, made with the degree of strength that it ought to have?—It must depend upon the width of the hold; but that will make the vessel very high, and the draught of water considerable.

With a vessel of the dimensions which you proposed, when last before the Committee, could not a steam engine, with an eighty horse power, be put into such a vessel?—No; unless the best part of the works was allowed to come upon the deck.

Then your reason for not proposing an eighty horse power for such a vessel, is merely the room which it will require, and its great weight?—Yes; I think we shall make a vessel with two thirty-fives, and fit a proper vessel for the Holyhead station, to go in any weather, and beat the present vessels on the station there.

Is there much additional expense incurred by increasing the engine's power?—No, very little.

Is there a great additional consumption of fuel?—Very little; we should require much larger wheels and broader paddles; by putting proper wheels for the two thirty-fives we should be able to make a sailing vessel as well as a steamer without any inconvenience.

What breadth of wheels?—About six and a half feet to seven feet; we are going to make this vessel very snug.

When you were last before the Committee you mentioned that you found inconvenience from the rolling of the steam vessels at Holyhead, have you reason to suppose in building a new one that inconvenience can be avoided?—Certainly, a great part of it.

By what means?—By narrowing the vessel, we are too stiff at present.

Will a vessel of that description be equally fit for bad weather and heavy seas?—Yes.

Have you heard in what manner the packets have gone across the Channel in the late easterly winds?—They were detained once or twice by a rough and very heavy gale; they could not sail.

Did it blow heavy at Holyhead from the east?—It blew very heavy from the east.

For what time?—I cannot say exactly, because I was not there, about a week.

Are those the first gales from the east that have been at Holyhead this year?—Yes, certainly, this year.

Did the steam packets make their voyages during this blowing weather?—One day they were detained at Howth.

Was not the Meteor a long time making her passage?—I do not know how many hours, but it was very bad weather, so bad, that the Liverpool steam packet could not come out, which shows the superiority of our vessels.

What number of small boats do you carry?—We carry one.

What number of people would that small boat contain?—We might crowd eighteen or twenty into it.

What number of passengers do you carry usually in one of your vessels from Holyhead to Howth?—Eighteen or twenty.

And what number do your crew consist of, independent of your passengers?—Fourteen or fifteen.

Making thirty in all?—Yes.

Therefore in case of any accident between Holyhead and Howth, you are not provided

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provided with sufficient means, especially if it were to happen in the night, to save yourselves and passengers?—We seldom go off at night; I do not think we could carry boats to save the whole.

Are you not aware that the steam packets for the purpose of carrying passengers generally from Liverpool, do take a much greater number of passengers than you mention?—From two to three hundred in one vessel.

If an accident were to happen in one of those boats at any considerable distance from shore, from fire or other cause, are they provided with any means for the purpose of saving the lives of the people on board?—No.

Are you of opinion that it would be possible for those vessels to carry such an increased number of boats on their quarters, or on deck, in such a manner as they might be stowed, without much inconvenience, as would be competent to carry and to save the lives of the passengers?—No; we could in our own, we can carry two.

Can you not carry one over each quarter?—We can carry two, but all that is lumber; we never think of being drowned or burnt now.

Are you not aware that the Liverpool steam boat called the Robert Bruce, took fire off the coast of Anglesea in the last autumn, when only a few miles off the shore, and ran with difficulty on the beach and saved the lives?—We are differently constructed from them; they placed all their coals on the top of the boiler, or the best part of them, which occasioned that ship to catch fire; we are very differently fitted up to what they were; that vessel caught fire in consequence of the coal being on the top, and the water got low.

Is it the practice in the vessels employed to carry passengers from Liverpool to the Clyde, and from the Clyde to Ireland, to be constructed in the same manner as the Robert Bruce was?—Yes; I believe it is.

Do you not think there is a great risk in so fitting out?—I do.

Then if those vessels were provided with all the precautionary means which are on board the packets employed in the post office service, would they not be enabled to save the passengers in case of fire?—I do not see how they could carry boats to save so great a number.

Is not the deck of the vessel of great width in proportion to the tonnage of the vessel?—Yes.

Supposing a steam boat measures 300 tons, register tonnage, what proportion would the deck bear to a ship of 800 tons?—Full as large as a ship of 800 tons.

Does not the extension of deck afford the means for stowing and carrying small boats with greater convenience than if there was less deck room?—Certainly; they could carry boats that way.

Might not a steam boat carry boats in the proportion of eight or ten tons to each 100 registered?—I think that would be attended with very great inconvenience; they might carry one over the stern and one over each quarter, and one on the midships.

Might those four boats be so constructed as to contain 150 people?—I am afraid not.

What number might such boats contain in your judgment?—About 120.

Would it not be prudent in your judgment that the legislature should provide that steam boats, in proportion to their tonnage, should carry a certain proportion of small or row boats, where employed for the purposes of carrying passengers only, and at a certain distance from land?—I think that would be a very good thing.

Mr. Timothy Bramah, Engineer, called in; and Examined.

Mr. T. Bramah.

You are acquainted with the properties and principles of the steam engine?—Yes, and in a general way with the principle of a steam boat.

What is your opinion with regard to the strength that may be given to an engine so as to prevent accidents?—I should prefer that the engine and machinery connected with it should be made of sufficient strength to provide for its being stopped by any accidental resistance, which should require its ultimate power; in other words, that it might be brought to rest without the fracture of any of its parts.

Have you had any experience of engines so strong as to meet with extraordinary resistance and still not give way?—One instance has come within my own personal observation, and another instance I have known some years since, from the best authenticated testimony, which was in a rolling-mill, where the rollers were supplied for the express purpose of ascertaining the strength of every part, and the engine was brought up without any accident. The other instance of my own observation was,

was, in a grinding-mill, where the machinery was instantaneously brought to rest without any accident to the engine or machinery.

Under what circumstances?—Owing to a sudden resisting medium, which equalled the momentum of the whole machine, occasioned by a piece of wrought iron getting between the stones.

Then you would propose that engines should always be made sufficiently strong to bear the greatest resistance?—Yes, but I do not mean to say, that they can with propriety be made so strong, that if the extremity of the paddle wheels came in contact with a hard substance they would not break; I mean to say that the machinery should be strong enough to resist the utmost effort of the engines without the fracture of any of its parts, in case of its being stopped by the sudden accumulation of water on one or both of the paddle wheels.

Have you had any experience with respect to the size of the boiler per horse power?—I have seen the boilers of a boat engine something less than sixteen cubic feet per horse power, and they have been made as large as twenty-eight feet per horse. I should think, according to the ordinary mode of construction, that twenty cubical feet per horse power would be sufficient for large engines; but I am of opinion, that a very great improvement may be made in the boilers of boat engines, where it is so very material to diminish the weight of the apparatus; I mean by diminishing the cubical contents of the boiler without lessening the superficial surface exposed to the action of the fire; as the quantity of steam evaporated in a given time, depends upon the surface exposed, and not upon the quantity of water contained in the boiler; the object of lessening it, in a great degree, appears to me clearly practicable; and I am very much confirmed in this opinion from an experiment I have lately witnessed in our own works.

Are you able from any experience you have had from the use of steam engines on board vessels, to give an opinion as to the quantity of power best suited to the object of making a vessel go with rapidity through water, and successfully through a heavy sea?—The more power that can be provided within the limits of the vessel, the greater the effect will be, and you cannot have too much power; indeed it is always of advantage to have as much power as can be obtained.

Does the weight of the engine increase in proportion to its power, very considerably?—It does increase; but I am not prepared to state in what ratio.

Can you say the difference of weight between two sixty horse power and two eighty horse power?—It is a matter of calculation; it is less than a direct proportion.

Supposing in a vessel of two hundred tons?—I should think that the additional weights of twenty horse power would not make a very material difference; and that the advantages of such increased power would be very great.

Then in constructing an engine for a vessel to be employed at sea, and throughout the winter, you would give such a vessel the greatest power that her size would conveniently admit of?—Yes.

Is an engine much more likely to go out of order from its power being very much increased?—No; I should think not.

So that the engines of two fifty horse power are not more likely to be out of repair than two of thirty?—I conceive not.

Then, except with respect to the space, you know of no reason against using the largest power?—None.

Suppose it was found by experience on sea voyages, to be desirable to reduce the breadth of the wheel to the greatest degree practicable; is it not on that account desirable to make use of an engine of the greatest possible power?—Yes, certainly.

In proportion as you diminish the wheel you ought to endeavour to give greater velocity to it?—Yes, certainly.

In constructing an engine, would you on all occasions use malleable iron in preference to cast iron for sea voyages, in every part of it?—Great part of it, certainly; there are some parts which cannot consistently be made with cast iron, as the piston rods and others.

Would you make the main shaft of cast iron or malleable iron?—Of cast iron, I think, unless very long.

Are you aware that several of the cast iron shafts have broken?—Yes; I have seen one or two instances.

Can the cast iron shafts be made as strong as the malleable iron?—I am hardly prepared to say; I have seen many instances of malleable iron of large dimensions very imperfect, in consequence of overheating; I should think there would be a difficulty in getting the shafts of a large size so perfect as the cast;

Mr. T. Bramah.

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Mr. T. Bramah.

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though it is a desideratum to adopt wrought iron shafts, as such shafts would yield the same strength with much less weight of material than those of cast iron.

Cannot those difficulties be overcome?—I think they might, by the possession of adequate means for their construction.

Then the defect of the shafts of malleable iron may be considered as owing to the imperfection in the construction?—Yes; I conceive so.

Is there any way by which you could prove the strength and fitness of a shaft of malleable iron to a steam vessel?—Yes; by subjecting it to tension, as in the case of chain cables.

Could this proof be applied by altering the proving engine to so large a mass of iron, as a shaft to an engine?—Yes, certainly; I have submitted a wrought iron shaft of seven inches diameter to a proving machine; and also one of four inches, which was broken; this machine was made for the express purpose of proving cables.

Was that shaft of four inches diameter a well formed shaft, or broken in consequence of an imperfection?—It was made to try the power of the proving engine, and in the section of fracture the iron was of very good quality.

What power did it take to break the four inch rod?—I cannot say at present; it is three or four years since: I believe we have a memorandum of it, but a bar of good wrought iron, inch square, will resist about twenty tons.

With such a proving machine might not a defect in common workmanship be easily discovered in a shaft of malleable iron?—A defect arising from the welding, the machine I have mentioned, would discover, but it only subjects the iron to tension.

But still it would ascertain in a great measure the perfection of the shaft?—Yes, in respect to its tension.

It goes to prove it is of sound material?—Yes, and adapted to its purposes.

Would it be expensive to construct a proving engine for ascertaining the quality of shafts made of malleable iron, supposing them of sufficient diameter for engines of sixty or eighty horse power?—A machine might be constructed of more universal application than the cable machine, so as to prove the shafts, not only in the direction of their lengths, but also to give them a transverse strain, exactly similar to that which is exercised on their application to the engine, and of sufficient force to prove the shafts of eighty or a hundred horse power engines. The expense of such a machine will be 600*l.* or thereabouts, but the cost will depend upon the length of it, and many other circumstances.

Do you consider a valve in the top of the cylinder to let off the condensed water a matter of importance?—Yes, I do; I have known one instance in which the beam of an engine was broken in consequence of the condensed water collected in the cylinder; by the introduction of this valve the accident would have been prevented.

Mercurij, 24^o die Aprilis, 1822.

Mr. James Brown, again called in; and Examined.

Mr. J. Brown.

(24 April.)

IN a vessel of 200 tons burthen, what sort of engine would you make use of with respect to power, in order to meet the resistance of sea navigation?—That would depend greatly upon the draught of water, the draught increases the resistance; for a vessel of about 200 tons, I should think from two five-and-thirties to two forties.

On what draught of water do you form your opinion?—About eight feet to eight feet six.

Are you aware that the average of the voyages of the Sovereign have been shorter by one hour than the average of the voyages of the Meteor?—No, I am not aware of that; but I should conceive it was owing to the increase of power.

Do you form your opinion about the power from your experience of the rate at which steam vessels have gone in smooth water?—From having been on board them at sea; I do not form my estimate from river navigation.

What is the greatest rate per hour at which a vessel has gone in still water?—The James Watt steam vessel is the fastest we know of, her speed is ten miles an hour through still water, independent of tide or wind.

Do you consider that the maximum of the rate?—It is hardly possible to say.

Would it require a greater increase of power to add to that?—The power required to double the velocity is as the cube nearly.

Do

Mr. J. Brown.

(24 April.)

Do you find that the speed of vessels can be increased above a very fast rate merely by increasing the power?—It is hardly possible to say that, because in some cases you might overload the vessel with the weight of the machinery and not propel her more than by a small engine; it is hardly possible to say what improvement might be made in speed; they have gone on increasing in velocity for the last two years.

Does not it stand to reason that in endeavouring to carry a steam vessel against a very heavy head sea you cannot have too much power?—I would certainly have a reserve of power; in fine weather you need not use it if not necessary.

Would not two engines of fifty horse power be better on board a vessel of 200 tons than two of forty?—Yes if you can bring the draught of water to suit, but I am afraid it would overburthen a vessel of that size.

Your opinion is, you should have the greatest possible power that will not contribute to increase the draught of water too much?—Yes, certainly; I should think the power on board the Sovereign was a very proportionate power for that station.

Could you put a greater power on board the Sovereign without bringing her down in the water?—I do not know how it would affect her, nor do I recollect the build of that vessel; I am not aware that a little additional power would make much difference; I believe at Holyhead you are confined for water as well as at Howth.

Supposing the effect of putting two engines of fifty horse power into a vessel of two hundred tons was not to require a greater draught of water than eight feet, and supposing that as much space in the vessel would be given up to the engine as was requisite, without consideration of the accommodation of passengers, would it not be better for the purpose of resisting heavy seas, to have two engines of fifty horse power than two engines of forty horse power?—No doubt of it.

What is the additional weight of the whole apparatus belonging to two fifties over that of two forties?—I think the weight of two forties would be as nearly as possible one hundred tons complete with duplicates, and I should think from twenty to twenty-five tons more for two fifties.

Do you include in that calculation the weight of water, coals, and every other apperage?—Yes, every thing complete.

Would two engines of fifty horse power be more liable to get out of order than two engines of less?—Not the least.

Would they require a much wider wheel?—Yes, they would, certainly, to absorb the power.

What breadth of wheel would be necessary for two fifties?—The least one could give them, would be nine feet; they ought to have more.

Do you form your opinion upon a vessel going in smooth water, or in a heavy sea?—In the sea; the Sovereign has two wheels of eight feet each.

What is the size of the boiler on board the Sovereign, as to the horse power of the engine, how many cubic feet?—I cannot possibly answer that question; I believe it is about fifteen feet long, and at one part fifteen feet wide; I do not think that the cubical content of the boiler has any thing to do with the horse power.

What depth of water is commonly kept up in the boiler?—That depends entirely upon the size of the flues and the power required.

Are you aware that a great difference of opinion prevails among engineers as to the cubical contents of the boilers, in proportion to the power of the engine?—Every engine maker has his own rule as to the size of the boiler.

Do you consider this part of the subject in any way settled?—No; every one has his own mode of constructing boilers; the generality of them, I believe, carry the smallest quantity of water possible.

As the great space that is required for an engine on board a vessel, forms one of the principal inconveniences, is it not desirable to reduce the cubical contents of the boiler as much as possible?—No doubt of it.

Might not this be done by maintaining the same superficial surface, and diminishing the actual depth of water in the boiler?—That would depend entirely upon the space you give in length for the boilers; because what you have not in length you must have in breadth.

Are the cubical contents of Mr. Watt's boilers, generally speaking, less than the cubical contents of other boilers?—I really cannot say; I have not given any attention to other boilers.

Was the expense of the engine on board the Sovereign much greater than that on board the Meteor?—I think about 1,000 l.

Mr. J. Brunton.

(24 April.)

What would be the expense of two engines of fifty horse power above the expense of two engines of forty horse power?—I think the two fifty horse power would be about six or seven thousand pounds, and the two forties would be about five to six thousand pounds; when you come to the difference of five horse power, the expense is very little more.

Is there not a method of supplying furnaces and engines with fuel by machinery?—There is.

Describe it to the Committee.—There is one adopted by Mr. Brunton, which is the best I have seen, which is a revolving fire-place, connected with the engine by means of a certain apparatus attached to it, by which the coals are let gradually into the fire as it turns round.

Does this method of keeping up the fires diminish the power of the engine?—I am not aware that it does.

Does it tend to save fuel?—I have heard that it does; but I am not aware how that has been ascertained.

Do you think this machinery could be applied to engines on board sea vessels?—I am afraid it would render it very complex, or if it would answer the purpose when done.

Would it take up considerably more room?—Unquestionably.

Does not it diminish the quantity of heat coming from the furnace in the places contiguous to it?—I have no experience to enable me to say that it does not.

Sir Edward Lees, called in; and Examined.

*Sir
Edward Lees.*

WHAT has been the general effect of the establishment of steam packets at Holyhead, on the arrival of English correspondence in Dublin?—A very considerable proportion of the mails have been delivered on the second day to the public in perfect time to answer the letters the same night. We have had the mails from England as early as half past two o'clock in the forenoon, at the post office; and the hour of delivery in Dublin is as late as six o'clock in the evening by the letter carriers.

Are all the letters that arrive before six delivered?—Yes; they are delivered that evening, all that arrive before six.

Have the mails arrived in many instances later than the second evening from London, when brought by the steam packets?—Up to the month of December (I am speaking from recollection,) I had particular occasion to examine at that period as to the effect; from the month of June, when the packets commenced, up to December, there were but twenty-six mails that were not in time to be forwarded from Dublin by the mail coaches that evening, a period of seven months; and that including several days while His Majesty was at Holyhead, when the mails did not go by the steam packets, but in the regular packets.

Before the steam packets were made use of, what was the usual arrival of the London mail in Dublin?—Comparatively the number was scarcely worth mentioning that arrived on the second day as early as four or five o'clock in the evening; I now consider the mail due in Dublin at three o'clock the second day, which we never did before till six o'clock the following morning. In 1805, when I first came over to England, before the arrangements were made as to the mails arriving at Holyhead, the number was not sixty in the year, which got over on the third morning for delivery; and I do not think twenty in the year reached London on the third day from Ireland.

If the London mails could be brought to Holyhead by half past four in the morning, at what time ought they to arrive at the post office in Dublin with the present average voyages of the steam packets?—It might be there in eight hours, or eight and a half; that would be one o'clock.

How long does it take to make a delivery of English letters after their arrival in Dublin?—I think the letters should be out of the post office on delivery within two hours.

At what time could persons have letters at the alphabet office after the arrival of the mail?—It is quite possible to give them in an hour and ten minutes.

So that the arrival of the London mail so early in the day would enable the merchants and traders of Dublin, to receive their English letters long before the

the hours of business were over?—They could receive them before the hour of change, three o'clock.

Sir Edward Lees.

At present they only receive them, generally speaking, after the regular hour of change?—Yes; after their dinner hour; generally after their counting-houses are closed.

(24 April.)

At what time does the office shut up for the receipt of English letters?—The public receiver is kept open till ten o'clock at night; the letters for which postage is paid, are excluded at seven; the interior parts are shut up at seven.

Then if the mail arrived so much earlier in Dublin it would be perfectly easy for men in business to write answers to their letters the same day that they receive them?—Certainly.

Be so good as to state to the Committee the various regulations adopted by the post office in Dublin for accelerating the dispatch of the conveyance and delivery of English letters?—I think we have carried into effect nearly every thing the Committee of 1819 recommended; I think that embraces the earlier delivery of the letters in Dublin, and the dispatch of the English letters both from Dublin and the interior, on Sundays; it also recommended the discontinuance of the practice of fees on the landing of passengers at Howth; it suggested a more extended delivery of letters from England through Dublin; and also a similar advantage through the alphabet. Those several suggestions have been acted on; the hour of delivery by letter carriers has been extended from five to six o'clock p.m.; and any mail that arrives so late as half after seven p.m. is delivered from the alphabet. The Committee also recommended, that the same principle of mail coach and rate of travelling should be observed in Ireland as in England.

Have any letters been sent from the interior for England on Sundays?—Regularly; on such lines as mail coaches exist upon.

Are letters sent from the interior of Ireland from any post offices for England on Sundays that are not on the mail coach line?—No; I do not think there are.

What is the reason of this exemption?—Because the post office pays but for the conveyance of six days in the week on the cross posts; and if you obliged the riding-masters to convey on the seventh day, they would make an increased charge; at the same time there are several lines of country upon which the mails might be conveyed upon the seventh day on which I do not think the post-masters could have any legitimate right of claiming that additional remuneration.

Would not the postage on letters sent on Sunday on those lines pay the additional expense thus charged for the rides?—Probably they might pay something; but the letters that did not go on the Sunday would go on the following day.

Does not your experience show you, that the greater number of days you afford for letters being written, the greater number of letters are written?—Most certainly.

Is it intended to make any alteration in the arrangement for allowing English letters to be sent on Sundays from the interior of Ireland?—Immediately previous to my leaving Dublin it was submitted to the government and approved of, with a view of saving the expense of the seventh day, that on some roads the mail should no longer come to Dublin on the Sundays from the interior.

Did not the public derive great convenience from the adoption of the recommendation of the Committee of 1819, in allowing letters to be sent from the interior of Ireland so as to go to England by the Sunday's packets?—Letters came from every line of road in Ireland on the Sundays.

Does not the regulation that prevents letters being put into the post office upon Saturday deprive the interior of the means of corresponding with London for two days in each week, in consequence of no letters being delivered in London on Sunday?—Exactly; the same arrangement which would debar from receiving the English mails on the Sunday in Dublin from the interior of Ireland, excepting on the lines that the contracts existed for the seventh day, would also have the effect of preventing their dispatch from Dublin.

Will the packets continue to go on the Sundays?—Yes.

What was the reason for withdrawing the regulation so recently made for sending English letters throughout the interior of Ireland on the Sunday night, and allowing them to be sent from the interior on Saturday night?—Merely to save the expense of the carriage, which was at the rate of one pound per mile per annum: to Cork, for instance, it is 126*l.* per year. The prohibition does not extend to more than two or three roads.

What is the gross amount that will be saved by this plan?—Precisely one pound

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per

Sir Edward Lees. per mile per anhum; I do not recollect the exact amount; I think not more than 250 l. a year, or 350 l.

(24 April.)

Have you the order for stopping the transmission of English letters on Sundays?—No, I have not it here.

Luna, 29^a die Aprilis, 1822.

Mr. Bryan Donkin, called in; and Examined.

Mr. B. Donkin.

(29 April.)

YOU are, I believe, a professional engineer?—I am.

Are you much acquainted with steam engines?—I understand steam engines.

Have you turned your attention to engines used on board vessels?—I have been employed professionally to examine several of them.

What is your opinion with respect to the quantity of power that should be given to an engine on board a steam vessel?—From the observations I have made in most of the vessels, I have found them to have too little power for the size of the vessels.

Do you speak with respect to vessels used in rivers or at sea?—I have been chiefly acquainted with vessels used on the river Thames; I have seen others, but I am not so intimately acquainted with them as I am with those upon the river Thames; I have no further acquaintance with them, as sea boats, than having passed on several occasions from Margate to the Nore.

Is it not more desirable to secure a sufficiency of power for the purposes of sea navigation than even for the river navigation?—I should think it highly desirable in either case.

Upon what rule has the quantity of power been regulated for vessels used in the river?—I believe we can scarcely say that any specific rule has been adopted as yet; we may even now consider that steam boats are in some degree in their infancy; but the conclusion that I have come to is, that it appears to be necessary that one horse's power should be employed for every two feet, and about three or four-tenths in the transverse sectional area of the vessel, to give the vessel a velocity of eight miles an hour through the water; I was first informed of this by Mr. Field, who has already been examined before this Committee, and I have confirmed it by subsequent observations upon other vessels; that is the only rule with which I am acquainted; if a greater velocity is required in the vessel, a greater power must be employed.

Then you take eight miles an hour as the maximum speed?—I take that merely as a standard, the general rule with regard to all vessels passing through the water is that the power to impel them must be as the square of the velocity, or very nearly so; there is a little difference probably, arising from the various shapes of which vessels are made, but the general law may be taken as true.

After having made use of sufficient power to impel a vessel through the water at the rate of nine or ten miles an hour, does not the quantity of power increase in a great ratio, which would be requisite to give an additional speed of one two or three miles more per hour?—To double the velocity you must have quadruple the power.

Does that practically answer?—I have tried it in several instances, and I have found it correct; sufficiently so for any practical purpose.

The power which is applied to vessels is, generally speaking, with a view of securing the rate of about eight or ten miles an hour, is it not?—It is, from eight to nine; I believe, independently of the wind, that ten miles per hour is a velocity seldom arrived at.

To secure the same rate of speed at sea, and in vessels navigating through the winter, and at all seasons, and in all weather, ought not the scale of power to be considerably increased?—With reference to the average power that has been employed, I think it would require to be nearly twice as much; we may consider the steam vessels under three different states; that is, going with a favourable wind; when there is no wind at all, and with an adverse wind; if the vessel and the steam engine be so constructed as to have the velocity required in its passage from one port to another, in still weather, the consequence would be, that there would be too much power for a favourable wind, and too little power for an adverse wind; therefore, I should recommend, that the steam engines be made considerably larger than necessary for giving it the velocity in still weather.

Do you consider it very desirable that the greatest strength for the size should be given to engines on board sea vessels?—Most undoubtedly.

What

What are the reasons that particularly lead you to form that opinion?—From having seen accidents in several steam boats, and various parts of the engines broken.

Mr. E. Donkin.

(29 April.)

Do you think, as yet, engines for sea vessels have been made too slight?—Many of them have; I believe there are very few of them but what have had accidents; one great cause I believe of those accidents, has been the making many of the parts of cast iron which ought to have been made of wrought iron.

You would, therefore, in constructing an engine for a sea vessel, make ner of the greatest power and the greatest strength that the room in the vessel would allow of?—Unquestionably I would.

Is there any practical inconvenience arising from increasing the power and strength of an engine?—None whatever, that I know of; excepting the expense and the room it occupies; but to counterbalance that, there is an advantage in not being obliged at all times to work the steam engine up to the extent of its power; supposing a hundred horse engine to be employed in doing the work of fifty horses, the quantity of coals consumed when so employed, would be less than in the proportion of the power; that is, it would be less than one half what it would be if the engine was performing a hundred horses work.

Is the engine more likely to want repair in consequence of its increased power?—Less likely; if it is not wrought up to its full power.

Does the weight of an engine increase very much in proportion to its increased power?—Not in proportion to its power.

Does the expense of making one increase in proportion to its power?—No; not after they get to a certain size; they are less then in the proportion of the power.

Is it not necessary to have the breadth of wheel in proportion to the power of the engine?—Yes it is; the breadth of wheel must be in proportion to the power of the engine.

Is it found by experience that the breadth of the wheel forms a difficulty in sea navigation?—I do not know what it may do at sea; but in the river Thames, where the crowded state of the pool exposes the widest vessel to the most danger in passing and being passed by a number of barges and other vessels constantly in motion, it is very dangerous.

What is the rule for regulating the breadth of the wheels in steam vessels?—I do not know of any precise rule; the resistance of the water against the paddles depends upon their depth in the water, as well as upon the width of the wheel; I have found, on comparing the wheels of different vessels, that the sectional area or that part of the wheel immersed in the water varied; but that about three-tenths of a foot might be taken as the quantity allowed for every horse's power.

Then it is upon this principle the breadth of wheel is now regulated?—Yes, I conceive so.

Have any improvements been made in the paddles of wheels?—No; I do not know of any, excepting that of making the arms of wrought iron, so as to lessen the weight; paddles have been made of a variety of shapes, but I believe it is immaterial what shape they are, provided the area or surface exposed to the sea be sufficient.

Has any method been invented for getting the paddles off the wheels so as to give the vessel the advantage of the sails in case the engine gets out of order?—I think, if they had proper fastenings there would be no difficulty in getting them off, or taking them up out of the water, very easily at any time.

In what way do the fastenings make a difficulty?—By long exposure to sea water the bolts become rusted, and sometimes break before they can be got out; bolts and nuts in such a situation are frequently so firmly united by rust as to require the bolt to be cut before it can be taken out.

What sort of boilers do you recommend as the best for steam engines at sea?—I would recommend boilers such as have been introduced into some of our best steam vessels, in which the fire is completely insulated by surrounding the whole of the fire-place and flues with water, and thereby securing the vessel against any accident by fire. It is my opinion, that in by far the greater number of vessels hitherto made, the capacity of the boilers and the quantity of water they contain are much too large; and that the fire-places and the surface of flues exposed to the fire and heated air are too small. By doing so, the vessels have been loaded with a useless weight of many tons, and the engines have been inadequately supplied with steam.

What is the right proportion between the contents of the boiler and the power of

Mr. B. Donkin.

(19 April.)

of the engine?—In some instances I have known it in the proportion of twenty cubic feet to one horse's power; that I think far too much. I believe that the quantity of water in a steam boiler for any boat need not be more than eight cubic feet of water per horse.

Will that size give steam sufficiently fast for the engine?—The quantity of steam supplied does not at all depend upon the quantity of water; it depends entirely upon the size of the fire, and the quantity of surface exposed to the action of the fire, provided there be but a sufficient quantity of water to cover the flues. I think the superficial area of the fire should not be much less than one foot to a horse, and the area of the whole surface exposed to the action of the fire need not be more than from ten to twelve superficial feet for every horse's power.

Have any boilers been made upon this plan that you are acquainted with?—The boilers which were originally made for the London Engineer steam packet, approach nearest to that principle of any that I have seen.

What is the proportion of the contents of her boilers to the power of her engine?—I do not exactly recollect; the superficies of the fire was sixty-three feet, that was rather less than one foot to every horse power; and it was the examination of that engine that induced me to recommend one foot to every horse power, because in order to keep up a good supply of steam they were obliged to put on coals very frequently.

Have you got the contents of the boiler?—The cubic contents of the water in the Engineer's boilers were 478 feet.

How many horse power?—They were working to the power of seventy horses.

What proportion does that make?—It makes nearly seven cubic feet to a horse.

That is a little under what you stated; you stated eight?—Yes; and it answered the purpose very well, and it need not be more than what I have stated.

How did those boilers answer?—They answer better than any boilers I have ever seen on board a steam packet.

Was there much attention requisite to keep the steam going?—Yes; there was great attention required to keep the steam up, because the quantity of fire-place was not sufficient; I think the fire-place ought to have been larger; the proportion is as sixty-three to seventy.

The proportion of what?—Of the superficies of the fire to the power of the engine; that is, there were sixty-three feet of fire employed to raise steam for seventy horses power.

Did it require great attention to keep the boilers properly supplied with hot water?—Not more than the ordinary attention required in steam boats, where the boilers are fed by hand.

Are not steam engines on land supplied by their own machinery with water?—They are supplied by a self-acting apparatus.

That is by a float?—By a float in the boiler, acting on a valve, which admits and shuts off the water as the water becomes lower or higher in the boiler.

Has the same principle been applied to boilers at sea?—I have not known one.

Then at sea the water is supplied by the attention of the persons who attend to the engine?—By the attention of the men.

What were the boilers made of on board the Engineer?—They were made of copper originally.

Do you conceive copper to be a better material than iron for making boilers?—I should prefer it decidedly.

What are the reasons that induce you to give it the preference?—Because the copper may be made thinner, consequently lighter, and it is much more durable.

Is it so much exposed to injury from the salt water?—No.

Can you obtain the steam faster in a copper boiler than in an iron one?—Yes.

Is it much more expensive?—Yes, I apprehend it would be considerably more expensive; I believe we can get a good wrought iron boiler at the rate of 38s. or 40s. a hundred weight, and a copper boiler, I suppose, would cost from 14d. to 16d. per pound.

What is the common thickness of a wrought iron boiler?—The thickness varies considerably; I have known them one quarter of an inch, and I have known them half an inch.

What is the usual thickness?—If the boiler is not very large, I think three-eighths is quite sufficient.

For what sized engine?—For very large engines from two to three boilers are generally used; therefore the size of the engine makes but little difference.

What

*Mr. B. Donkin.**(29 April.)*

What is the common thickness of a copper boiler?—Three-eighths of an inch for the bottom, and one-fourth of an inch for the sides and top.

Is there not this advantage in using copper boilers, that after the boiler is worn out the old material is worth nearly as much as the original price of the boiler?—Yes; whereas wrought iron is worth very little or nothing.

Is less fuel necessary for a copper boiler than an iron one?—Yes; I should think there is a saving in the fuel.

What is the weight of boilers of wrought iron for two engines of forty horse power?—About eighteen tons.

What is the weight of boilers made of copper for similar engines?—About fifteen tons.

Were the boilers of the Engineer steam packet altered?—They were altered.

In what way?—They were made of wrought iron.

Can you state the reasons for altering them?—I believe the proprietors were induced to do so, under an idea that they would generate more steam, if made much larger than the copper boilers; they were put in and did much worse than the former ones.

Had any thing occurred to induce the owners of this vessel to put aside the use of the copper boilers?—I believe the chief reason was, that the vessel did not go quite so fast as one or two other vessels from London to Margate; and they thought that if they had more steam the engines would be more powerful, and perhaps come up to the velocity of other vessels; they were altered with a view to increase the quantity of steam. The copper boilers had been at work two seasons, and to all appearance as good as when first put in.

Did they increase the cubical contents of the boiler?—They did.

In any considerable degree?—The cubic contents were nearly doubled.

What was the effect of this alteration upon the speed of the Engineer?—The effect was that the vessel went much worse than she did before; they had lessened the fire-places and had increased the quantity of water in the boiler; the weight of the boiler was increased likewise, so that altogether, I believe she drew from four to five inches more water than she did at first; the weight of the boilers was, I believe, thirty-three tons, and they contained about eighteen or twenty tons of water.

Then by altering the boilers for the purpose of giving them a greater proportion of cubical contents to the power, they did not succeed in their object of getting more speed?—No, they got less.

Are you acquainted with any other steam vessels that have copper boilers?—No; I have not seen any; I believe they have been generally objected to on account of the expense.

You believe that is the only objection?—I believe so.

In case the engineer omits to supply the boiler with water, is not a copper boiler more liable to be injured by the fire?—No; less liable, I think.

What is the effect of negligence in supplying sufficient water?—The effect is that the water becomes expended, and the bottom of the boiler being unprotected by any water upon it, is heated red hot, the plates become softened, and the expansion of the steam generally forces them down towards the fire.

Are land engines now supplied with fuel by machinery, without the aid of workmen?—There is a new apparatus recently introduced to several engines near London, for the purpose of lessening the consumption of fuel and supplying itself.

Is it found to answer?—Extremely well.

Is the consumption of fuel much lessened by this apparatus?—It is found to combine the two advantages of burning the smoke, and of lessening the quantity of fuel consumed.

Are you of opinion that this apparatus may be applied to engines on board ships?—Yes, I think with very great advantage; it probably would require a little variation in its construction.

What are the general advantages of this plan?—The general advantages are economy of fuel and labour, and greater safety to vessels.

In what way do you consider that it would contribute to greater safety?—Because it would prevent the continual operation of feeding the fire by hand, which requires the fire doors to be open every five or ten minutes, and the frequent stirring of the fire occasions a great deal of the ignited coals to fall through the grate and upon the floor, whereas, in this apparatus the coals are supplied by the machine itself; the fire doors need never be opened excepting about twice or three times a day.

What becomes of the ashes in this plan?—They fall immediately from the grate upon a cast iron plate; but the quantity of ashes made is very small; I suppose a hundred horse engine would not make five bushels in a day.

Mr. B. Donkin.

(29 April.)

Is there not a great loss occasioned by the constant raking of the fire?—A very great loss; I have made some experiments lately as to the consumption of fuel in the ordinary mode of feeding the fire by hand, and by the use of this apparatus, and we have found, with perhaps one of the best constructed furnaces of the kind, that the new apparatus produced a saving of twenty-five per cent. of fuel.

On board steam vessels is it not frequently necessary to take off the fire altogether to clear the grates?—That depends very much upon the kind of coal that is used.

Is it not sometimes necessary to clear the fires as often as every four hours?—It is; and with some coals, much oftener.

Would this trouble and labour and delay be all saved by the use of the apparatus you have just mentioned?—In the engines I have mentioned they only find it necessary to stop twice a day to clinker the fire.

Is it necessary to stop the course of the vessel to take off the fire?—No, they do not stop altogether; but it impedes the vessel by lessening the supply of steam.

Not for any length of time?—No; they do it to one fire at a time, but the operation is frequent, and they are obliged to have the door open when they do it, and a current of cold air rushes in and cools the boiler.

Does the fire produced by this apparatus work more regularly and powerfully than the fires supplied in the ordinary way?—Yes it does; small portions of coals are introduced upon the rotary fire place at certain intervals, so that the fire is regularly supplied; the combustion goes on entirely at the surface, and the incombustible matter, such as the vitrified parts of the coal, and the ashes, settle down upon the bars, and protect them from the action of the fire.

You have not stated the influence of the fire in producing steam, and its heat?—There is a greater quantity of radiant heat and flame given out in the direction in which it is wanted, namely, upon the bottom of the boiler; in ordinary fires, supplied by hand, a great quantity of the heat is lost downwards upon the ash-pit; I believe that, together with the exclusion of the cold air, are the chief causes in producing a saving of fuel. Comparing this method with the old one, less than half the size of the fire-place will answer the purpose.

It produces steam quick, does it not?—That depends upon the supply required; there is a mode of regulating the quantity of coal supplied at each interval, so that if you have a regular demand for steam you can give a corresponding supply of coal.

Would the operation of this machine be affected by the rolling of the vessel in a heavy sea?—Not more than a common fire.

By whom was this apparatus invented?—A Mr. Brunton, who has a patent for it.

Is it coming into general use?—I know of several; I think the first was introduced at Messrs. Liptrap's distillery; I there saw two of them at work, one applied to a steam engine, and the other applied to a very large still.

Has it ever been tried on board ship?—Not to my knowledge; I believe not.

Could it be readily affixed to any other person's engine, not made by the inventor?—Yes; any engine.

How long has the patent been taken out?—I should imagine the patent must have been taken out about three years; between two and three years. The same apparatus has been applied to an engine at Chelsea, belonging to the Grand Junction Waterworks Company.

Does this apparatus consume its own smoke?—Nearly so; I have seen them working with that engine, which is of a hundred horse power, for an hour together, and there has not been as much smoke as arises from a common kitchen fire.

Veneris, 3^o die Maij, 1822.

Mr. Bryan Donkin, again called in; and Examined.

(3 May.)

UPON what principle is the machinery in a steam vessel arranged?—I believe the principle is to place the centre of gravity of the whole mass of machinery, with the load of water, and so on, nearly in the middle of the vessel. There has always been a difficulty in the arrangement of the machinery to get it low enough. Most of the steam vessels with which I am acquainted have been made with flat bottoms, and the consequence is that the weight of the machinery raises the centre of gravity of the vessel too high, and the vessel becomes very liable to roll.

Do

Mr. B. Donkin.

(3 May.)

Do you know how the centre of gravity of the vessel with the machinery in it bears with respect to the water-line?—The adjustment ought to take place between the centre of gravity of the vessel and the centre of buoyancy. The centre of gravity of the vessel and its contents ought to be below the centre of buoyancy; for if the centre of gravity were to be placed above the centre of buoyancy, the vessel would then overturn; and the nearer they approach each other, the vessel will be more subject to roll; the lower it is, the steadier it will be in the water.

Has the centre of gravity, in any instance, to your knowledge, been above the centre of flotation?—No; I do not know that it has.

Does it approach anywhere near?—I have been on board some of the flat-bottomed vessels, where I have observed the position of the vessel to be considerably altered by a few of the passengers changing their places from one side to another, consequently the two centres must have been very near each other. But although this circumstance renders a flat-bottomed vessel very unsteady in the water to a certain extent, yet she is prevented from going over altogether, because the figure of the transverse section of the fluid displaced is continually changing with every change of position of the vessel, so as that the centre of buoyancy is removed from the middle of the vessel nearer to the side to which the vessel inclines, and thus the vessel is thrown back again towards the contrary side.

What contributes principally to prevent a steam vessel in a heavy sea from going over?—This, in every case, will depend upon the relative positions of the centre of gravity and the centre of buoyancy, and the force of the sea to which the vessel is exposed. If, as in flat-bottomed vessels, the centre of buoyancy is removed to a greater distance from the centre of gravity, or as in vessels where the transverse section is of such a figure as to admit of the centre of gravity being placed considerably below the centre of buoyancy, the vessel will not turn over so long as the force of buoyancy on one side shall exceed the force of the wind and sea on the other. A steam vessel for sea should be keel-built, which would give an opportunity of placing the machinery, boilers, &c. and, consequently, the centre of gravity, much lower than can be done in a flat-bottomed vessel.

Would the tendency of the weight in such a case be to prevent the vessel going over?—Certainly; the centre of buoyancy would be considerably above the centre of gravity.

Then the weight would be continually contributing to place her in an upright direction, like ballast in a sailing vessel?—Yes; the weight of the machinery, &c. would supply the place of so much ballast.

Has any improvement been made recently in respect to the arrangement of the machinery on board sea-vessels?—I have seen a plan, which I am of opinion will be an improvement of some consequence; but as I was confidentially consulted upon it, I hope the Committee will see the propriety of my not explaining it here. With the general principles of the invention I may make the Committee acquainted. The advantages of such an arrangement will be the simplification of the machinery of the steam engines; the opportunity it would give of introducing longer cylinders, thereby giving a longer stroke to the engine, and superseding the necessity of employing cog-wheels, as has frequently been done for the purpose of lessening the number of revolutions of the impelling wheels, compared with the number of strokes of the engines; and it would render the engine much more independent of the strength of the vessel to which it might be applied, and less liable to accidents. Mr. Brunel, of Chelsea, is the author of this invention.

What is the difference practically in the height of cylinders for engines used on land and cylinders used for engines at sea?—I should think nearly one half less at sea than on land.

Then in that proportion the engines at sea work to a disadvantage?—Not in that proportion; for in consequence of being shorter, and the pistons moving slower, they are made a little larger in diameter; but there is a considerable disadvantage in it, both as to the consumption of fuel and the working of the engine; as in the latter it requires more frequent alternations of the beam, the piston, and the valves, which occasion more wear upon the parts than where the cylinders are made longer.

Have you heard of any improvements in other parts of the machinery being in contemplation?—I have heard of several projects, but I believe none of them to be effective. I have heard of none which I consider as essential improvements but the one I have mentioned.

Is not there considerable difficulty in keeping the boiler clean?—Yes.

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(3 May.)

From what cause?—The deposition of salt.

What methods are taken to prevent the deposition of salt?—I know of only two methods. In the Regent steam boat they employed a method very successfully, and that of pumping the hot water through the boiler, and allowing a certain quantity constantly to be discharged from it into the sea; by these means the water was always kept in a sufficiently diluted state, so as to prevent it becoming saturated with salt, and consequently none could be deposited.

Is this process going on while the boiler is at work giving steam?—Yes, constantly going on.

Does it produce no inconvenient effect upon the steaming power?—No otherwise than by requiring a greater consumption of fuel. The boiler is supplied by the hot water drawn out from the engine by the air-pump, and introduced into the boiler generally at a temperature of 90° or 100°, so that whatever was the surplus quantity of boiling water thrown out, that quantity would be lost, and the consumption of fuel would be increased. The other mode is the common and ordinary one of taking out the whole of the water when they arrive at the place of destination, and putting in fresh, and if there is any deposit of salt, taking that out also.

How is it taken out?—They have doors or apertures near the bottom of the boiler, which can be opened or closed at pleasure for that purpose.

Will there always be a certain deposit of salt after a voyage?—The only answer I can give to that question is, that if the passage is of such duration as to allow the water to become saturated with salt, there naturally will be a deposition of salt after saturation has taken place.

With every care taken to prevent it?—There will be, unless the water is continually diluted in the way I have mentioned in the first instance. I believe it to be the safest mode.

Have you met with instances of any inconvenience arising from neglecting to take out the water after voyages?—Yes, I have; where the inconvenience was such as that one of the boilers generated very little steam; there were three boilers in one vessel, and one of them produced very little steam. We ascertained that by its requiring very little water to be introduced into it from London to Margate; therefore we know it could not have the effect it ought to have in generating steam.

What is your opinion with respect to making use of cast iron in the machinery of sea-vessels?—My opinion is, that every thing which by possibility could be made of wrought iron ought to be so made.

Would you make each part of the greatest possible strength?—I would make every part of a steam engine for sea-service at least of three times the strength of that which by estimation would be required to resist the power of the engine when in its ordinary state of working, in order that they might effectually resist the violent shocks to which they must necessarily be exposed in a gale of wind and a heavy sea. Accidents are most likely to happen at a time when the suspension of the power of the engine would be the most fatal.

That is, whatever the force of the engine was, you would make the various parts equal to three times that force?—At least three times.

You would not then make any part with a view of giving way in case of any particular pressure upon it?—Certainly not.

What would be the effect of an engine made as you describe, in case it was stopped by any excessive pressure?—The engine having been made strong enough to resist the greatest force to which by probability it might be exposed, such a force being brought against it the engine would stop without any harm ensuing.

What would be the effect of the re-action upon the boiler?—Just the same as when the engine was stopped for any other purpose, as frequently happens in the river, to take in passengers; the effect of that is, that the steam is not taken off by the engine; its expansive power or force increases so as to open the safety-valve, and it blows up the tube, and goes to waste.

Have you seen engines come to a stop in this way without any inconvenience?—Never at sea.

Have you seen it at land?—At land I have.

Will you mention an instance?—I attended an experiment some time ago with Mr. Field, who has paid great attention to the subject of steam boats. The experiment was upon a small engine, but the various parts of the engine being made in proportion to the power, it amounts to the same thing; and in trying the experiments we two or three times brought the engine up very rapidly, and nothing happened.

The

The steam went off by the valve?—Yes; there is always a provision made for that purpose.

Is there any difficulty in making large shafts of wrought iron?—There is with some people; but if a sufficient price be offered for them there is no difficulty in procuring them.

Then in your opinion all defects in wrought iron shafts may be completely guarded against by a proper selection of material, and a proper attention to the construction of them?—Yes; I think so; I object to cast iron in every instance where heavy consequences are depending upon their breaking, because I have seen many instances where cast-iron shafts have broken repeatedly, and in lieu of which wrought-iron shafts have afterwards been put in, considerably smaller in their dimensions, and of less weight; and I have not known one instance of their breaking.

May not the quality of the shafts and other parts of the machinery be submitted to a proof previous to their being made use of?—Yes, undoubtedly; but an effectual and satisfactory proof of shafts, applied to this purpose, would require a machine which would try the strength of a shaft by twisting it.

To what sort of strain are the different parts of the machinery exposed?—The shafts are exposed to a force in a twisting direction; the connecting-rods, and the links, and the piston-rods, are exposed to a strain in the direction of the length.

Does not the security of the machinery very much depend upon the constant care and skill of the individual engineer who happens to be in the management of it?—Certainly it does.

By what sort of neglect is the engine exposed to be broken?—By suffering the bearings upon which the shafts work, and the links connecting the piston with the beam, to get loose, and in some cases making them too tight, so as the bearings heat, and by not attending carefully to the adjustment of the steam-valve when the vessel is exposed to a heavy sea.

Is not very great care necessary in starting an engine that there should be no water upon the top of the piston?—Yes; either care should be taken that the water deposits itself in some other receptacle, or if it accumulates there, that it may make its escape without breaking any part of the engine.

Does water form there after a voyage from the condensation of the steam?—It frequently forms there after stopping the engine. There are two remedies for that inconvenience, one which would go nearly to prevent it altogether, and the other to prevent any mischief accruing if the water should be deposited upon the piston. There ought to be a valve immediately over the boiler in the steam-pipe, which would prevent the steam from coming into that part of the steam pipe, from which the condensed water would run into the cylinder. Whenever the engine is stopped, no steam ought to be permitted to come into the pipe of communication. The other mode is that which was suggested by Mr. Field, and which has been successfully applied: it is that of fixing a valve on the top of the cylinder, which allows the water to be forced through it, and prevents the danger which otherwise might arise from its accumulation.

Then you consider this valve as adequate to its object in preventing mischief to the machinery?—If it be made large enough, I should think an engine with such a valve would be perfectly secure.

What description of persons are commonly employed as engineers on board steam vessels?—Men who are called engineers; a set of men accustomed to attend engines; some of them engine-makers; and in my opinion no man ought to be employed on board steam boats as a superintendent, or to have the care of an engine, but one who perfectly understands the nature and construction of an engine.

Are they commonly working men?—Yes, working men.

Do the owners of steam vessels on the river, or in other places, where you are acquainted, place any sort of inspection over the managing engineer?—I know of one instance where a superior kind of inspection was aimed at, but I think it is discontinued now; I believe the steam-engine-makers are resorted to when anything happens to the engine. The inspection rests upon the proprietors, who generally have one man at least, in each vessel, as an engineer of superior skill.

Is it customary for the proprietors themselves to inspect the engines?—They generally have an inspecting manager, or a committee of management; but I have reason to believe that some of the steam boat companies have suffered severely from a want of regular professional inspection.

Would it not contribute to the safety of the engines and of the vessels, if occasional inspections

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inspections were made by scientific and regular engineers?—I am of opinion that it would be found highly advantageous.

Have you been employed yourself to inspect steam engines used in vessels?—Occasionally I have inspected many on the river Thames.

Have you discovered on those occasions much neglect on the part of the engineers?—In some instances I have.

Should particular care be taken with respect to the coals used?—I think the coals ought to be particularly attended to; first, the kind of coals, and secondly, to avoid taking small coals, so long as the common fire-places are used; small coals occasion great waste; and all coals employed for steam boats ought to be screened.

In your opinion, what is the best quality of coal for steam engines?—We find on land in and near London, the Wylam coals are preferred for steam engines.

What is the peculiar property of this coal?—They produce less slag, or clinker, and turn more to ashes than most of the Newcastle coal. I think great care ought to be taken how, or in what state, coals are deposited on board a steam boat, for I believe several accidents have happened at sea (and I know they have on land) from their having been taken in wet, and laid in a warm place; the warmth accelerates the decomposition of the pyritic matter; and where coals are laid in a large heap under such circumstances, and the pyrites are very abundant, the coals take fire spontaneously.

Then you are decidedly of opinion that coals ought always to be put on board in a dry state?—Yes, I should recommend it.

Are all coals liable to this generation of heat by being put together in a damp state, and afterwards exposed to heat?—I cannot say all coals, but all Newcastle coal contains a greater or less quantity of pyrites, and are liable to do so.

Have you known any instances where Newcastle coals have taken fire in this way?

I have known one instance where a heap of coals took fire which were lying near the boiler of an engine, for which I could account in no other way.

Was the engine to which you now are alluding on land?—On land.

Does it require a very large mass of coals to produce this spontaneous combustion?—That I do not know; I have not any satisfactory experience of it.

Have any instances come to your knowledge of boilers on board vessels having burst?—I have heard of several boilers bursting, but have only seen one of them.

In your opinion, what was the cause of so many boilers bursting?—I saw one at Norwich after the accident had happened, and that had arisen from employing high-pressure steam. The boiler was a composition of wrought and cast iron, very injudiciously made; that part which was made of cast iron burst. There was another instance which occurred, I believe, two or three years ago, on the Thames. I did not see it myself, but I believe it was occasioned by the boiler having been badly made.

Are the boilers now usually made of wrought, or cast iron?—I believe of wrought iron universally for steam boats, excepting they are made of copper.

Do you recommend boilers to be made of copper?—Yes; I recommend copper, it will last ten times longer than iron boilers. I believe, taking iron boilers in general, they will not last more than two or three years.

Are high-pressure engines used now?—I believe they are not in this country. I understand they are used in America; but I have no certain knowledge further than report. But I am informed they make the boilers very different for high-pressure engines to what they do for the low-pressure engines; they are made circular, of a very small diameter, and of considerable length; the plates are of much greater strength than the ordinary wrought iron boilers.

Suppose a wrought iron boiler to give way, does it fly, or is it rent?—I never knew but of one instance of a wrought iron boiler flying; and I could only account for it in this way: it was a common shaped boiler, with a bottom convex upwards; the boiler was used for the purpose of generating steam of forty pounds per square inch, and employed for evaporating sea-water to procure salt. I believe the boiler had been suffered to become dry, or nearly so, and in that state the last portions of water would occupy the lowest parts around or on each side of the bottom of the boiler; the crown of the bottom would be exposed to the action of the fire after the water had been evaporated from it, and the plates of the bottom becoming red-hot, and therefore more pliant, would, from the expansive force of the steam, become flat, or driven downwards; upon which the remaining water round the sides flowed over upon the hot plates; thus a large quantity of steam would be suddenly generated. The top of the boiler was completely rent from the bottom, and projected through the roof of the house to a considerable distance.

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In the instance you mention, you state that the boiler was employed to generate steam at the rate of forty pounds to a square inch on a high pressure; how many pounds to a square inch are employed in the engines on board the steam vessels?—From two to four pounds; there need not be more.

Do you conceive that boilers at the rate of two pounds to four pounds per square inch are in any degree exposed to accident?—I believe they are perfectly safe.

What would be the effect if a wrought iron boiler, from weakness of any of its parts, or from any other cause, were to burst?—Merely a leak in the boiler.

Would the materials of the boiler fly into pieces?—No; I apprehend it is quite impossible.

Then the whole inconvenience from the bursting of a wrought iron boiler, in a general way, at this low pressure, would be merely a rent in the boiler, and a leak?—Nothing more.

Is it difficult to repair an injury of this kind done to a cast iron boiler?—So difficult that it is scarcely ever attempted.

Are boilers made of copper equally free from being liable to bursting as boilers made of wrought iron?—Equally, if not more so.

What would be the effect upon the copper, in case of a part of it yielding to the force of steam?—Precisely the same effect as I have already described. It would occasion a leak, by which the steam or water would escape.

To what cause do you attribute that the same effect was not produced in the high-pressure engine you spoke of?—To the cause I have already stated, namely, the sudden generation of a large quantity of steam under a very high pressure.

Could that take place in the steam engines used on board vessels?—No; I do not think it is possible. From the construction of the bottom the water has always a tendency to settle to that part of the boiler where there is no fire, so that there could be no sudden flowing of the water over that part of the bottom of the boiler which might by accident become red-hot.

Would it not be better to have fresh water than salt water for the boiler?—Most undoubtedly.

Might not a sufficient quantity of fresh water be carried on board a steam packet to supply the boiler?—I think it possible to carry water sufficient to supply the boiler alone, but that it would be very inexpedient to do so.

Suppose the boiler were filled, in the first instance, with fresh water at the port of departure, might not sufficient fresh water be carried to supply the wants of the steam during a voyage of six or eight hours?—No, I should think not.

What is the consumption of water in two engines of forty-horse power per hour?—About forty-five cwt.

Since salt water is so injurious to the boiler, would it not be at all times right to fill the boilers in the first instance with fresh water before the vessel went to sea?—It would lessen the inconvenience, certainly; sea-water is objectionable with regard to steam engines from two causes, first, its action upon iron boilers, if they are used, and secondly, the deposition of salt. In the use of copper boilers, the first objection does not hold, because sea-water has very little action upon copper.

Are you acquainted with the passage from Holyhead to Howth?—No.

The distance being fifty-six miles, and the sea exposed to very severe gales and strong tides, supposing a packet sailed every morning from Howth, and another from Holyhead, throughout the year, how many vessels, in your opinion, ought to be made use of to perform this service, that they may go to sea in the best possible state, and with the machinery in perfect condition?—I think, with our present experience upon steam boats, I should be unwilling to risk less than four.

What are the reasons that induce you to think there ought to be that number?—In order that proper attention might be paid to the engines, the state of the boilers, and every thing upon which the safety of the vessels depends; and in case of accidents to one vessel, always to have another at each port ready to go to sea.

Would you propose that each vessel should lie-by a day after its passage, or sail a certain number of days together, and then lie-by for a general examination?—That ought to be regulated by what must result from experience; that is, by ascertaining at what period, whether in one, two, or more passages, the water became saturated so as to deposit salt.

Then as soon as you found a deposition of salt beginning, you would think it necessary to stop the vessel one day, to clear the boiler properly?—Whenever the water became saturated at the boiling temperature, it ought to be changed, but that might

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be effected without stopping a day, provided another set of hands was employed for that purpose, and set to work immediately after the vessel is moored.

Is it not essential that the whole engine should occasionally become cool?—On some occasions it is; but there is an advantage in keeping a steam engine at work as long as possible, because if it is suffered to get cool, the same degree of heat must be restored to the water and every part of the engine.

Would you be rather in favour of the same vessel performing a certain number of voyages before it stops?—Yes, as many as possible; but the only inducement to do so would be the lessening the quantity of fuel consumed.

How would you ascertain whether the water was depositing salt?—By ascertaining the specific gravity of the water in the boiler, or by drawing out a little water from the bottom of the boiler.

How often would you do this?—At the end of every passage.

Do you think it very essential to ascertain the specific gravity of the water after every voyage?—I do think it essential, until it is satisfactorily ascertained how long a boiler will work before the salt is deposited.

Have you, in the course of your experience, discovered inconveniences in consequence of neglecting it?—I have; in the Margate boats.

Is there much to do in giving the machinery a complete examination?—That would very much depend upon the state in which the engine, &c. might be found at each examination. But I think the closest examination might be given in a day.

Would there be any parts of the machinery to open or to undo?—Yes; it would frequently happen so.

But this examination, you think, could be effected in one day?—Yes; I think it might be effected in one day, unless there was any thing materially wrong.

Are not the repairs of those engines necessarily a considerable expense?—Occasionally they are, when any of the principal parts of the machine become broken, or the boilers injured by accident. By having four vessels the machinery might be kept in better order; the state of the boilers better attended to; and, in my opinion, the establishment would be rendered much more certain and effective.

Do you conceive that the injury from neglect to engines is greater than the injury arising from the actual working of them?—Yes, I do.

Has that been a constant defect in the management of steam vessels up to this period?—Yes; I conceive so.

Would you attribute most of the accidents to this neglect?—I should attribute most of the serious accidents to neglect, particularly the accidents to the boilers.

If a vessel goes to sea with its engine in every respect perfectly in order, in your opinion, is it much exposed to injury from the obstructions it may naturally have to contend with?—Not more so than the best constructed steam engines at land.

Then, in your opinion, the engines would, when properly looked after, continue to work without injury or interruption for a long period of time?—For a long time, excepting ordinary wear and tear.

Are you acquainted with any contrivances made use of on board steam vessels for putting out fires in case of accident?—Some of the vessels have had extinguishing engines and hose on board; and I think they should always be provided.

With all the care that can be taken, would it not be better to have every precaution in addition, in the way of sufficient power, to obtain water upon an emergency?—I think it would be highly necessary to have an extinguishing engine.

What do you mean by an extinguishing engine?—An engine for throwing water, either to be worked by the steam engine itself, or by the sailors; it would be very easy to have both; one might be affixed to the engine, and the other might be upon deck. In the instance of the *Regent*, which caught fire, if they had had an extinguishing engine, or any means provided by which they could have obtained water, they might with the greatest ease have prevented the destruction of the vessel.

Could those extinguishing engines be procured at a small expense?—Yes; I suppose from 30*l.* to 50*l.* according to the size of the engine.

At what expense could an apparatus of this description be affixed to a steam engine?—I suppose 20*l.* or 30*l.* independent of the hose necessary; taking the engine in its most perfect state, it would be a trifling expense.

Could you say what the expense, in your opinion, would be?—I should think there

there would be no necessity to exceed a hundred pounds in its most perfect state, and it would have the effect of giving great confidence to the public.

What quantity of water could be thrown up, do you suppose, by one of those extinguishing engines?—That would depend upon the size of the engine. But an engine of a moderate size would throw much more water than could, in my opinion, ever be required: for in a steam vessel at sea, a fire could rarely or ever happen without its being discovered immediately after its commencement, and in that state a little water well applied would extinguish it.

Do you conceive that the present method of constructing vessels for the purpose of navigation may be much improved?—I believe they may. I have already mentioned Brunton's rotary fire-place, in which the fuel is regularly supplied by the machine itself; and Mr. Brunel's proposed new arrangement of a part of the machinery: both of which, I am of opinion, will be found valuable improvements in steam vessels. I am of opinion also that much may be done towards the improvement of these vessels by attending to past experience. From repeated failures we have seen the necessity of a better adaptation of the power of the steam engine to the size of the vessels; of making the vessels and engines of greater strength; of a more suitable selection of materials; of the inutility of using small vessels and small engines for such a purpose; of the necessity of most carefully guarding against fire by providing a safe receptacle for the coals, and in the construction of the fire-places and boilers; of lessening the quantity of water in the boiler; of preventing the deposition of salt; of increasing the size of the fire-places and flues of the boilers, so as to lessen the labour of the men, and secure an ample supply of steam; for although many vessels have been built possessing some of these requisites, yet very few if any can yet perhaps be said to possess the whole.

Mr. B. Donkin.

(3 May.)

Mercurij, 8^a die Maij, 1822.

Mr. Marc J. Brunel, called in; and Examined.

HAVE you paid attention to the subject of steam vessels?—Yes.

Have you been concerned in building: any?—In disposing the machinery to a vessel that was built.

What vessel was that?—The Regent.

At what time, in what year?—In the year 1816.

Have you paid particular attention to steam vessels in respect to their qualities for sea navigation?—Those I have seen were not constructed in such forms as to be well calculated for sea, they were as buoyant as possible; they were better calculated to accommodate the machinery than to contend with the element.

Have you seen any of the packets lately built by the Post Office?—No, I have not.

What form of vessel would you recommend as the best for using steam at sea?—I should say that the best water-lines are desirable for navigating, consistently however with the depth of water that may be permitted, according to the navigation.

With respect to the strength of her built, would you recommend that the vessel should be much stronger than usual for sailing vessels?—No; because the strains to which steam vessels are liable, have less of that violence and of those destructive consequences that are incident to sailing vessels. The structure requires therefore less strength upon the whole; but the strength, so far as it is wanted, should be distributed differently, in order to preserve as much buoyancy as possible.

Would you build a vessel stronger than the ordinary strength used for naval service?—Less; on the ground I have stated before.

Do the engines, at present made use of on board steam vessels, appear to you to be imperfect?—The best steam engines I have seen and have heard of, are remarkably well executed. I have, however, considered them as being too complicated for the duties they have to perform against a heavy sea, and deficient too of certain combinations that are indispensable to moderate and restrain their power. Their power should also be employed in a more direct way than it is now; and they should not be cramped by short strokes.

What part of the machinery do you consider, at present, the most defective?—The defects now complained of do not arise so much from the mechanical arrange-

Mr. M. J. Brunel.

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ment of the steam engines, since they are found to perform so well in easy navigation, as from the nature of the service they have to perform, when they are contending against a heavy head sea and a tempestuous wind. It is in these circumstances that the irregularity, sometimes the deficiency, and accidentally the total absence of the resisting medium, that throws the ungoverned and almost irresistible power of the steam engine into those convulsive starts that meet with no other controllable check but the arm of the crank, from which it recoils with increased energy to the opposite side, occasioning thereby those destructive shocks, those alternate strains and wrenchings, which, on frequent recurrence, must prove fatal to the cranks and to the shafts, besides other parts of the machinery. The defective part, therefore, is the want of certain combinations that may enable the engine to adapt and accommodate itself spontaneously to all the exigencies, and to all the perturbations; incident to its peculiar service.

When you say that you would apply the power more directly, to what part of the machinery do you allude?—I mean the steam engine acting upon the crank.

That is, the interposition of the crank necessarily prevents the power from acting as direct upon the wheels as it ought to do?—Yes; nevertheless, the crank is the most simple, and on that account the most eligible agent we are acquainted with in mechanics, for effecting a rotary movement from an alternate power.

Can you suggest any remedy for that inconvenience?—Viewing the crank as the best medium of connection, I see no inconveniences in its application to wheels; but I propose to remedy the inconvenience now felt by the interposition of certain combinations that will act spontaneously, and that will cause the engine to accommodate itself to all the casualties of the service which it is calculated to perform, so that, in those circumstances, when the resisting medium is partially or totally removed, the power will not be materially increased in its speed, which is the desideratum in relation to sea navigation.

Have you had opportunities of seeing steam vessels at sea?—I have not happened to be in rough weather, but a person who has been nearly five years at sea, as I have been, can judge very well.

Then the great difficulty to contend with in sea navigation is the irregularity with which the engine has to perform its duties?—Yes; certainly.

Must not the difficulty always exist in a great degree as long as it is the practice to have wheels upon the outside of the vessel?—Wheels on the outside have evidently their peculiar disadvantage; nevertheless, as they have been found, by practice, to answer better than any other means, we are equally sure of, I think, that the disadvantages will be very materially lessened if they are kept steady in their action.

Is not the want of space on board the vessel a principal reason for not being able to make the machinery more simple?—No, certainly not; that is, I think I shall take much less room and make it more simple in my plan.

Do you propose to increase the length of the stroke?—Yes; that is a great object.

Is not the present short stroke of engines on board sea vessels occasioned by the want of room?—Yes; but however small the vessel, I can arrange mine so as to answer in all circumstances.

Shall you be able to preserve an equal degree of power in your plan?—More so.

In the present mode of constructing steam engines for sea vessels is there not a very complicated combination of machinery?—It is too great a complication, arising not altogether from a want of room, for many of them are roomy enough, but arising from the manner in which the steam engine is connected with the crank.

Does not that combination occasion a great friction on various parts of the machinery?—It does; and occasions a great absorption of power.

Does not such combination necessarily expose the whole engine to frequent accident from the nature of the element which it has to contend with?—Certainly.

In a vessel of 200 tons burthen, what quantity of power would you apply for sea navigation?—It depends very much upon what speed you want.

Suppose the object be to perform sea voyages through all times of the year and in all weathers?—I think they have in general employed more power than is required, from which it results, that the weight of the boilers, of the fuel, and of a ponderous machinery, are extremely disadvantageous, as it has been found in several instances, when, with a view of making some additions or improvements, they have turned out to be productive of worse effects by lessening the buoyancy.

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That is, those different circumstances counteract the object of high power?—Yes, *Mr. M. J. Brunel.*
it does counteract it very materially.

If those defects which belong to the present system could be removed, should you then say that the power has been generally too great?—Yes; because an excess cramps the machinery still more, and the short strokes are incalculably bad.

For a vessel of 200 tons burthen to be used at sea, which should you prefer, two engines of thirty-horse power, or two of forty-horse power?—I should prefer two of forty-horse power where speed is the only object in view; but for a safe and steady navigation, under all circumstances, I should adopt the smaller power, as being sufficient and consequently preferable.

Would a greater power also contribute to enable the vessel to contend with more advantage against a heavy head sea?—What a greater power might do, would, I have no doubt, be neutralized by those inconveniences to which I have adverted before.

Has it occurred to you to be possible to dispense with the use of wheels upon the outside of steam vessels?—Yes.

Have you made any experiments?—Yes.

As far as those experiments have gone, do they induce you to feel confident that a plan may be discovered by which the use of external wheels may be altogether got rid of?—I believe so, though the vessel might not go so swiftly.

Do you think a vessel so constructed may go with equal certainty and equal power in contending with bad weather and heavy seas?—I think it would.

Have you been concerned in any plan by which some vessel of this sort may be established at Portsmouth for the preservation of lives in case of shipwreck?—I addressed the Navy Board in 1816 upon that subject, in consequence of some successful experiments I had previously made.

Then your plan goes to having a vessel that may contend with the worst description of weather, and for the purpose of affording assistance in case of shipwreck?—My plan was to construct a vessel calculated to do the duty of the buoy-boats, which, when signals of distress or guns are heard, are immediately ordered out to afford assistance; but as the sailing vessel cannot beat against the elements in stormy weather, I proposed to form the body in such manner, and to adapt such machinery, as might contend with advantage against almost any bad weather that may be experienced in these latitudes; allowance made however for those hurricanes when vessels are carried away from their anchors by the mere impetuosity of the wind.

Would it be necessary to sacrifice much of the speed of the vessel?—I dare not say how much or what proportion, because my models were upon too small a scale; they were very satisfactory, but I should not like to decide the proportion.

Have you turned your attention to the manner of applying heat to the boilers of steam engines?—Yes.

What object do you propose to obtain by a change of the present mode?—That the combustion of the coals may be productive of greater heat than it is by the ordinary method.

Has not an invention of Mr. Brunton's contributed very much to improve the method of heating boilers?—Mr. Brunton's invention is very good, but it is expensive, and is not applicable to all circumstances; I am now engaged in carrying on some experiments on a steam engine of my own, upon my plan.

Does your plan promise to be of use to engines on board sea vessels?—Yes; I think it would be very good for them.

Will it prevent the necessity of supplying the fire by hand in the way now done?—The object is not to open the door frequently.

Will it remove the necessity of clearing the fires so frequently as is now required?—That is one of the objects.

Letter to Sir Henry Parnell, Bart.

Sir,

Understanding that the impression left on the minds of the Select Committee of the Holyhead Road, after my examination on the subject of steam vessels, is that my proposed improvements on steam engines are on those denominated the high pressure, I take the liberty of removing that impression by stating, that though my suggestions, in the year 1816, went to recommend, for the peculiar service I had then in view, high pressure steam engines, as being of lighter tonnage than the condensing ones, I am however well aware that for packets the latter is preferable; and under that impression, those improvements I am now engaged upon, are directed

Mr. M. J. Brunel.

(8 May.)

directed entirely to the qualifying that power for the new service to which it is now applied by the condensing action.

When we contemplate the scale of those steam engines that are introduced in steam navigation, and contrast them with the space within which they are confined, we may easily account for a considerable proportion of their estimated power being absorbed; first, by the want of range of action in the steam cylinder; secondly, by the shortness of the cranks; thirdly, by the complication of the machinery; and fourthly, by the irregularity of the resisting medium upon which their immense power is brought to act. We must further remark, that in this locomotive service any unnecessary power, or any excess of it, is attended with a proportionate appendage which must be carried along and which must operate as an incessant drawback upon the progress of the vessel.

Having had the opportunity, since my examination before the Select Committee, of seeing the largest and best steam vessels that navigate between England, Ireland and Scotland, (some of which with cylinders forty-two inches in diameter, consequently equal occasionally to upwards of one hundred and twenty horse power), and of examining attentively their machinery, I feel the more convinced that there is an excess of power in marine engines, or that with less power an equal effect may be produced.

Now the object of my improvements is, first, to give a longer range of action in the steam cylinder; secondly, to lengthen the stroke of the cranks; thirdly, to simplify the mechanical arrangement; and fourthly, to control and moderate the power, so as to restrain it within a proper and safe rate of action.

In land steam engines we never hear of beams or cranks giving way, of shafts and wheels very seldom; and upon the whole, a steam engine that must work day and night for a twelvemonth meets with hardly any stoppage, and after twenty years of regular service, we find every part, without almost any exception, as sound as when new erected. These advantages are the result of that moderator of action which is peculiar to them, namely, the fly-wheel and the governor. But fly-wheels for moderating a power equal to about one hundred and twenty horses, is obviously impracticable; nevertheless, we may find means that may attain the same end in those confined limits we are restricted to.

I have no doubt but the moderator of power will give to the marine engine a new character. It is now as it were a gigantic untamed animal, which has to go through rocky and uneven ground, dragging by main force its load; or rather, an unwieldy truck with small wheels and large axletrees.

Nothing can be more dangerous than when a land steam engine is accidentally disconnected from its moderator; still the land engines of thirty-horse power are not confined in their mechanical arrangements; all the parts are accessible, and assistance may readily be afforded. But one may conceive what must the convulsive perturbations be, as those occasioned by a power four times as great, exerting its unrestrained energy upon the cranks and the shafts, in a marine steam engine.

Although no material accidents have happened, the mischief resulting from more wear and tear is incalculable, independently of the horror it must add to the situation in which a vessel is during a storm and at night. They have, it is said, exceeded all expectation in contending against the elements; but at what risks, and at what expense! Nevertheless, as they are destined to perform much greater wonders than they have yet done, I flatter myself that the application of the moderator will prove a very material improvement and a very important step in the advancement of that new navigation.

I have the honour to be, Sir,

Your most obedient and humble servant.

Chelsea, 8th June 1822.

M. J. Brunel.

Mr. William Evans, called in; and Examined.

Mr. W. Evans.

CAN you suggest any improvements in building steam vessels?—I can make such improvements as will enable us to go a mile and a half, or two miles, an hour faster than at present.

Do you mean by a different method of constructing the vessel, or by a different plan with respect to the engine?—The combined arrangement of the engine and the vessel; neither part will do without the other.

Are you the builder of the Meteor and Severn steam packets on the Holyhead station?—Yes.

Do.

Mr. W. Evans.

(8 May.)

Do you conceive that you can now construct a steam packet so that it may have more speed by two or three miles an hour than either of those vessels?—By a mile and a half, or two miles an hour.

Would you make use of engines of greater power?—The same power and the same tonnage, or nearly so, not any material difference.

Would you build a vessel equally strong as those vessels?—Equally strong, on the diagonal principle.

In what way would you render the same quantity of power more available in giving more speed?—I would keep the same nominal tonnage of the boat, but by placing the engines in the centre, with a body of less resistance than in the present steam packets.

Would you make use of the same sized boilers?—The same sized boilers.

Would it be heavier?—Rather lighter.

Would you use one engine or two?—Two engines; one standing before the other, working at right angles; the same in that respect as the present engines.

The whole difference between this plan that you propose, and the plan adopted in the Meteor and Severn steam packets, consists in the arrangement and position of the machinery?—By placing the engines in the centre, we have a sharp body and a smaller resistance, that increases our speed; we cannot have a sharp body by the present method of placing the engines, without keeping them so high as to endanger the stability.

Has any vessel been fitted up with an engine upon this plan?—There have been small vessels upon this construction, merely to try whether they would act with the same power.

Have you put them on board a vessel?—There is one now ready; the steam will be up to-morrow.

What sized vessel is it?—The vessel is fifty-three tons and two eight-horse power engines.

Is the vessel finished, fit to be made use of?—The engines will be at work to-morrow; she will be going down the river on Sunday, I believe.

Who made the engines?—I employed the engineer myself, Mr. Yates. This boat is so small it will not accomplish what I have stated for the packets of eighty-horse, but her speed will be equal to the post office packets of forty-horse power.

Have you built many steam vessels?—Twenty.

Have you been at sea in any of them?—I have been to Margate sometimes, and I have been over in the Holyhead packets.

Are you able to suggest any plan by which steam vessels may use sails with advantage?—A vessel of the description I have mentioned is much better adapted to sailing than the common steam packets.

What sort of sails would you put upon her?—I am not a competent judge of those parts.

What is the name of this vessel you have built?—The Union.

What is the length of her deck?—Seventy-five feet.

What is the breadth of her beam?—Twelve feet.

How many feet of water does she draw?—Five feet.

What sort of lines has she?—The easiest possible lines.

Is she built as a model for a larger vessel, in respect to her lines and shape?—I fitted up the engines with a view of trying what the effect would be.

Is she for the river or for sea navigation?—To run from Dover to Calais and Boulogne.

Luna, 13^e die Maij, 1822.

Sir Isaac Coffin, Bart. a Member of the Committee, Examined.

Sir Isaac Coffin,
Bart.

(13 May.)

CAN you give the Committee any information respecting the injury done by salt water to boilers used for steam engines?—I can. In the general average of salt water, there is a gallon of salt to thirty-three and a half of salt water; consequently when the steam, being the aqueous particles of the water, are expelled, the salt is left behind, which adheres to the bottom of the boiler in the shape of a crust, and tends to precipitate the destruction of the bottom of the boiler. At Portsmouth every week or ten days the men were put into the boilers to remove this adhesion in the shape of salt at the bottom. There are two steam engines at Portsmouth, originally

*Sir Isaac Coffin,
Bart.*

(13 May.)

put up for the purpose of pumping the water out of the basin that had been before let into it from the docks; the ability of the engines enabled them to throw out 3,000 tons of water in an hour; they also worked the saw mills and the block machinery when not employed in pumping the water out of the basin.

How often was it necessary to clear the bottom of the boilers?—I have said the men were turned in once a week.

Do you know what thickness of crust was formed in that time?—That depends entirely upon the time the engine is employed in those different purposes, or the quantity of steam expended.

Are copper boilers exposed to an equal degree of injury as iron boilers?—Certainly not.

Have you any experience of the superior qualities of them?—Inasmuch as the salt does not act upon the copper in the same proportion as it does upon the iron. The copper boilers have in consequence been substituted at Portsmouth instead of iron; also at New York, the steam boats are all furnished with copper boilers instead of iron; though attended with considerable expense, yet in the end they are found to be cheaper than the iron boilers.

Did they formerly use iron boilers at New York?—They did.

Then they have given them up in consequence of the superiority of the copper?—They have; and in the event of expansion, they are not so subject to accident as iron boilers; for when the boilers split they do not fly off in pieces so dangerously as in iron boilers.

What instance do you know where this has occurred?—In coming from New-haven to New York, pushing through Hell-Gate to save her tide and increasing the steam, occasioned the boiler to burst, when no accident happened, the hatchway only over the boiler being lifted a foot or eighteen inches.

Are you acquainted with many of the steam vessels at New York?—I have seen the steam vessels used between Quebec and Baltimore, a distance of seven hundred miles. I have gone in them myself. I have gone from Quebec to Montreal, down Lake Champlain, down the Hudson River, Delaware River, and down the Chesapeake Bay to Baltimore.

Whose engines are made use of in America?—All the steam boats on the river St. Lawrence have Boulton and Watt's engines, and one at New York, the rest are of American fabric.

Do any of the American vessels perform sea voyages?—There is one now that goes between New York and New Orleans, touching at Charleston in the Havannah, having made her voyage constantly without any accident.

For what period has this vessel been on this service?—Between two and three years.

Does she go all the winter?—I cannot answer that question, having been put in motion since I came away.

Mr. Michael Faraday, called in; and Examined.

Mr. M. Faraday.

You belong to the Royal Institution?—Yes.

In what situation are you?—Chemical assistant to that institution, under Mr. Brande.

Have you turned your attention to the action of salt water on boilers used for steam engines?—I have turned my attention to the action of salt water, and the salts it contains, on iron and copper.

Be good enough to state the result of your examination into those effects.—The principal source of injury to iron arising from the salts contained in sea water, when they remain by evaporation, result from the presence of the salt called muriate of magnesia. When in solution, it acts more on iron than its accompanying salts; and when dry, it is decomposed at a heat of 270° of Fahrenheit and upwards, liberating muriatic acid; and this immediately acts upon the metal much more strongly than any other substance which the water contains. Hence, besides the burning of the boiler, which takes place when the metal is coated by the salts, there is this additional strong action from the liberation of the free acid.

In what manner does this muriatic acid act upon the metal?—By causing its oxydation, and forming a soluble salt with it.

Does it act when in solution as well as when gaseous?—In both states.

Would the muriatic acid produce any effect upon the pipes and parts of the engine connected with the boilers through which the steam passes?—If the water were evaporated from the boiler so that the salts should become dry on any part of it, and

and sufficiently hot, then the acid gas would pass into the steam passages and into the cylinder.

Mr. M. Faraday.

(13 May.)

Will not this muriatic acid be generated and consequently be passed through the different parts of the engine whenever the degree of heat shall attain 270° Fahrenheit?—That could only happen in the low pressure engines, by the neglect of the engineers in giving a sufficient supply of water.

Is the muriate of magnesia you have described as existing in sea water, constantly acting upon the metal?—Yes; in experiments of four or five hours duration, the solution of the salt was constantly acting upon the iron with which it was in contact.

Is the injury considerable that this salt does to the metal?—Compared with that produced by equal quantities of the other salts in sea water, I should say four or five times greater.

What other salts are deposited in the evaporation of salt water?—Muriate of soda, muriate of lime, sulphate of lime, and some other salts in very minute quantities.

Do each of these salts injure the metal?—They each, when in solution, as in sea water, injure the metal more than pure water would do; but none of them so much as the muriate of magnesia, and none of them liberate muriatic acid by heat alone.

Do your answers apply to the action of the salts upon iron or copper?—To the action on wrought iron.

Do those salts produce as much injury on copper as you have stated they produce upon iron?—By no means.

Can you say in what degree the difference of injury is?—I have not had time to extend my experiments to precise results on copper.

Can you say that the difference of action is very considerable?—Very considerable.

Is it so great as to induce you to give a decided preference to the use of copper over iron in cases where salt water was necessary to be used for evaporation?—

Does not the formation of the salt in crusts upon the bottom of the boiler very much diminish the action of the fire upon the water in producing steam?—Certainly. Yes.

If the force of the fire is not expended in producing steam in the degree it ought to do, supposing no such crust to exist, will not the degree of heat which ought to pass through the bottom of the boiler to the water, go along the flues, and thereby contribute to burn and destroy them?—Yes; supposing the flues are of materials to be injured by heat.

Have you tried any experiments to ascertain the manner in which the different salts contained in salt water are deposited by heat?—I have. Taking 1,000 parts of sea water by weight, and evaporating, I found that 825 parts nearly of steam could be driven off before any deposition commenced, but then sulphate of lime was deposited; on proceeding with the evaporation till about 110 parts remained, the common salt began to crystallize and deposit; on continuing the evaporation till only 35 $\frac{1}{2}$ parts remained, the muriatic acid from the decomposition of the muriate of magnesia began to separate.

In boilers containing large quantities of salt water and giving steam for working engines, are those depositions of salt continually going on?—That will depend upon the water supplied to the boiler; if the whole of the steam were condensed and returned into the boiler, there would be no concentration of the water contained in it; but if there is a loss of steam and sea water be supplied to the boiler in its place, a deposition of salt will take place, more or less rapidly, according to the loss of steam.

It is in this way the concentration takes place of the body of water which produces in the result these crusts upon the bottom of the boiler which occasions so much injury?—Just so.

Is it easy to ascertain the degree of concentration which takes place?—Very easy.

What is the process?—I would recommend an hydrometer, an instrument the workmen could easily apply without any trouble.

The person in the care of the engine could at all times ascertain the state of the water in the boiler?—Yes; he would have to draw a small portion out, which he could easily do I suppose, and then apply the hydrometer to it.

Have you turned your attention to any remedy for the inconvenience arising from the use of salt water in steam boilers?—If possible, the use of fresh water would remedy it; and if that is not possible, I would suggest the removal of the sea water

Mr. M. Faraday.

(13 May.)

in the boiler before it be too much concentrated, and the supply of fresh portions of sea water; precautions being taken to supply them in such a state that they would do no injury, or cause any intermission to the working of the engine.

Where it is possible to obtain fresh water for boilers, should not care be taken in selecting the kind that is made use of?—Certainly.

Are you acquainted with any instances of injury to the metal parts of the engines arising from the use of foul fresh water, or water impregnated with earthy salts?—Every furred tea-kettle offers an instance of this kind of injury. In them the same process goes on as in many boilers in Cornwall. There are instances where considerable depositions of carbonate of lime have taken place in boilers from the use of water containing calcareous matter. There are two specimens at the Royal Institution of considerable depositions in pipes from the passage of calcareous water through them; one of them being, I believe, the feeding pipe to a boiler, and being nearly two-thirds choked with earthy matter (carbonate of lime).

Has the cold salt water much influence upon iron?—Yes, it acts much more strongly than cold fresh water upon it.

Does it act upon copper and brass with equal force as it does upon iron?—No.

Could any chemical means be made use of to counteract the injury occasioned by the several salts contained in the boilers of steam engines using sea water?—I know of none to counteract the injury arising from the muriate of soda and muriate of lime; but I should think it probable that that, arising from the presence of muriate of magnesia, might sometimes be advantageously corrected by the addition of either lime or the alkalies to the water before it be introduced into the boiler; I suggest this merely from theoretical views; but such additions would produce the salts found by experiment not to be so injurious to the iron as the muriate of magnesia.

What portion of the water contained in the boiler may be raised into steam before the salt is deposited?—About eight-ninths, not quite nine-tenths, before the salts are deposited.

Does it occur to you, that, with common care and attention on the part of the persons entrusted with the supply of water to boilers, that this deposition might be prevented?—I conceive there would be no difficulty in supplying hot sea water, and in withdrawing portions of the concentrated water in the boilers in such a manner as to preserve the whole mass below the point of deposition.

Would you say this could be done for many hours successively?—I should think for days, weeks, or months successively. It is the only mode that occurs to me of preventing the salts from being deposited in the boilers, and I think it easy to put in practice.

After the voyage is completed, the whole engine necessarily becomes cool, will not, in that state, the salt deposit very rapidly?—If this operation were resorted to, the water in the boiler should never be in a state to deposit crystals; it never would be in that state.

Then, by using the precautions you suggest in preventing the concentration of salt water, the business of emptying the boilers after the voyage might be performed without any considerable deposition of salt?—If the means of prevention suggested are applicable, they should entirely prevent the tendency of the water to deposit salt in any state or at any time, and then it may be drawn off without leaving any crust at the bottom. I should mention, that there is a salt deposited from sea water, the sulphate of lime, which would form a crust at the bottom, but in small quantity, compared to that produced by the muriate of soda; it would require cleaning out sometimes. However, four-fifths of the sea water might be evaporated before even this deposition would take place.

Do those salts when decomposed fasten strongly on the metal or become incorporated with it?—I should think that would depend much upon the state of the boiler; they would probably in most cases form hard crusts adhering to the bottom.

Can those crusts be easily removed after the water is drawn off?—It is a hard crust, and would probably require considerable labour to pick it up.

Do those crusts contribute considerably to prevent the proper application of the force of furnaces upon the water in the boiler?—They prevent, to a very considerable extent, the transmission of heat through the bottom of the boiler to the water, in consequence of their bad conducting powers as regards heat.

Are they worse conductors than the metal itself?—Very much so.

Can you state to the Committee what effect these crusts have in the diminishing the making of steam according to the quantity of fuel consumed?—It would require considerably

considerably more fuel to raise the same quantity of steam, but I am not able to give a proportion.

Mr. M. Faraday.

(13 May.)

Do these crusts contribute to hasten the burning of the bottom of the boiler?—Yes, by preventing the transmission of the heat through the bottom of the boiler, the metal itself becomes much hotter than it ought to be, and consequently burns away much sooner than it should do.

By so much heat not being transmitted through the bottom of the boiler, it follows that the flues must become hotter than they ought to be, and thereby be considerably injured?—Yes.

Have you tried any experiment to show what salts a cubic foot of sea water contains?—I have only estimated it as regards the muriate of magnesia, that being the most injurious salt. The cubic foot of sea water weighs about 1,026 $\frac{1}{2}$ ounces, avoirdupoise; it contains 3.28 ounces of muriate of magnesia, which, if completely decomposed by heat, would give rise to 2.13 ounces of muriatic acid; this is able to dissolve or corrode 1.6 ounces of iron; and if it were found useful to decompose this muriate of magnesia, it would require 1.64 ounces of quick lime, or 2.78 ounces of dry potash, or 4.1 ounces nearly of common pearl ash.

What quantity of copper would the muriatic acid, capable of being separated from the cubic foot of water by heat, dissolve?—The utmost quantity would be 3.7 ounces, but the probable quantity from the nature of the salt found, would be one half or 1.85 ounces. Copper is much less liable to the action of muriatic acid than iron is.

Charles Williams, Esq. called in; and Examined.

HAVE you turned your attention much to steam vessels?—A good deal.

C. Williams, Esq.

Have you had an opportunity of seeing and sailing in many of them?—I have seen and sailed in almost all the steam vessels on our coasts.

What occurs to you to be the principal defect in the machinery now generally in use?—I conceive the engines nearly as perfect as ever they will be, that is to say, all inside the vessel. The external wheels appear to me to be almost the sole ground of inconvenience and mischief.

In what manner do the wheels operate to produce obstructions in the way of the proper speed and the power of the vessels?—The violent action of the paddles in a heavy sea striking the water, shakes and strains both the vessel and machinery, and produces what Captain Percy of the *Hero* has very well described, as having a tendency to drive the top and bottom asunder; the result of this severe action is, that the engine loses its speed, and scarcely performs one-half or one-fourth of what it should do.

Has any plan come under your observation, by which those inconveniences can be removed?—Yes; there is now a plan adopted in the *Waterloo* plying between Dublin and Liverpool, and in the *Havre-de-Grace* iron steam vessel now on the Thames.

Be so good as to describe it to the Committee.—The paddles, instead of being fixed as in the common wheel, revolve with a continuous motion on their own centres; the result is that they always enter and rise out of the water with a soft and easy motion, no matter what their immersion may be.

By whom was this plan invented?—Mr. Oldham of the Bank of Ireland.

Have you made a voyage in the *Waterloo*?—I have.

In what sort of weather?—Extremely severe weather.

Was the sea very rough?—As heavy a sea as I ever saw in the Channel.

Did the paddles answer their purpose?—Remarkably well.

Was the voyage in your opinion a fair and complete trial of the efficacy of that plan?—Decidedly so; the *Waterloo* made her passage several hours sooner than she could before under the same circumstances.

Was the wind adverse?—The wind was not adverse; part of the way the wind was on the beam. The vessel then lay on her side; the wheel was occasionally so deeply immersed as to be nearly axle deep, notwithstanding which the paddles worked as smoothly and as efficiently as if the vessel had been upright.

Did the wheels perform their evolutions in the regular and proper time?—They did. On leaving Liverpool the first day the new paddles were tried, the *Waterloo*, which was always a very heavy sailer, made her passage nearly as quick as the *Belfast*, which is a very quick one. The *Belfast* sailed an hour and a half after the *Waterloo*; the *Waterloo* was in considerably before her.

Is the *Belfast* reckoned a good steam vessel, and does she make quick voyages?—One of the best and quickest on the station now in use.

What

C. Williams, Esq.
(13 May.)

What will be the great advantage which may be derived from this new plan of paddles?—All the straining of the vessel which is occasioned by the old paddle wheels would be removed; the engines also would work as smoothly and without jerking in rough as in smooth weather. In coming to anchor in a tide way, as at Liverpool, the paddles are no drag on the vessel's way, and prevent her dragging her anchor. Again, in case of accident at sea, the paddles being placed edgewise, enable the vessel to use her sails to advantage; the vessel's head also may be brought about instantaneously, and without stopping the engine, by placing the paddles on one side edgewise; those circumstances have all occurred within my knowledge.

Is not the present limit of the use of power of steam on board vessels occasioned by the necessity of increasing the size of the wheel in proportion to the power?—Decidedly so. I know no way of applying the power of large engines without a dangerous increase of the size of the wheels.

Will not it therefore be practicable to make use of a much greater degree of power than has hitherto been used if this plan of paddles shall prove to be as efficacious as you have described?—Certainly so; any extent of power may be used without straining the vessel or causing any injury, consistently with the size of the vessel.

Will those paddles work when more immersed in the water than the paddles now in use commonly are?—It is indifferent to the action of these revolving paddles how deeply they may be immersed. Were the revolving paddles at present on board the *Sovereign*, one of the Holyhead packets, the projection might be diminished two feet on each side.

Is it difficult to substitute those paddles for the paddles now in use?—They may be substituted without any alteration of the vessel, merely taking out the old wheel and putting the new one in its place.

In the voyage you made in the *Waterloo* did any of the paddles give way?—Nothing gave way.

What is the power of the engine?—The maker estimates them at two thirties; but according to Mr. Watt's calculation they are but little more than two twenty-fives.

What is the tonnage of the vessel?—Two hundred and ten tons; she is very clumsily built, and originally intended for a trader; bluff in the bows and very heavy behind, and twenty-two feet beam. The captain of her writes to the following effect, after having had repeated opportunities of proving the efficacy of the paddles; he says, "The easiness of the motion through the water is wonderful; instead of the violent shaking which was formerly the case, it is now scarcely perceptible that the engine is going. They are beyond a doubt a great acquisition to the *Waterloo*." I have in my hand a description of these paddles, which I beg to deliver in.

[The Witness delivered in the following Paper.]

THIS invention has been found to remedy the many defects to which the common wheel with fixed paddles must ever remain liable. It has already been successfully adopted on the *Havre-de-Grace* iron steam vessel, and on the *Waterloo* now plying between Dublin and Liverpool.

In order to remove any apprehension as to the liability of the revolving paddles getting out of order, the patentee will warrant them for twelve months, if made under his own directions, or by manufacturers approved of by him; injuries arising from neglect, being run foul of, or other violence, excepted.

Advantages resulting from the use of the Revolving Paddles.

First.—The violent action of the paddles of common wheels in striking the water in a rough sea, which shakes and strains both the vessel and the machinery, is entirely removed by the use of the revolving paddles, as they enter and rise out of the water with a peculiarly soft and easy motion.

Secondly.—The revolving paddles cause the engines to work as smoothly and as efficiently in rough weather as in a calm. When a vessel with fixed paddle-wheels rolls, and the paddles become deeply and suddenly immersed in the water, the engines do not make one-half or one-fourth their required number of strokes per minute; not unfrequently they are then so overloaded as to stop altogether; the paddles thus become a source of great danger, and check the vessel's way at the moment when their propelling power is most required.

Thirdly.

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(13 May.)

Thirdly.—When a vessel is carrying sail with a side wind, it often becomes necessary to take in the sails, and sacrifice all the advantages and speed derivable from the wind, otherwise the leeward wheel (in consequence of the vessel laying over,) would be so deeply immersed as to work to great disadvantage, and even to impede her way. This very serious inconvenience is entirely obviated by the revolving paddles, which work equally well when axle deep in the water, as when the vessel is upright.

Fourthly.—In bringing the head of the vessel about in a narrow tide way, or when the sails are taken aback by a sudden shift of the wind, the revolving paddles afford the greatest assistance. In such cases, the paddles on one side of the vessel may instantaneously, by any ordinary seaman, and without stopping the engines, be placed edgewise to the action of the water; the entire power of the engines then acting on the other side, causes the head of the vessel then instantly to come about. This is effected without the smallest violence to either the vessel or the engines.

Fifthly.—As it is indifferent to the action of the revolving paddles how deeply they may be immersed in the water; vessels furnished with them are enabled to carry a heavier freight than if appointed with common wheels, as the latter cannot work to advantage if immersed more than twenty inches, or two feet.

Sixthly.—In case of accident to any part of the engines or boilers, when at sea, the revolving paddles may be placed edgewise, and by thus presenting no impediment to the vessel's way, she is enabled to use her sails to the greatest advantage. Should the wind be then on the beam, the paddles have the additional advantage of acting as lee-boards.

Seventhly.—As the revolving paddles cause no loss of power in striking the water, as they enter or rise out of it, vessels appointed with them go much faster than if furnished with common wheels.

Eighthly.—The revolving paddles do not require so large an external projection as common wheels do. Where the engines are above thirty-horse power, the projection for common wheels is so great as materially to affect the ease and safety of the vessel in a rough sea. (See Captain Percy's evidence.)

Ninthly.—Vessels with revolving paddles are enabled to employ to advantage engines of much greater power and with commensurate speed, than if fitted with common wheels. Vessels with common fixed paddle-wheels, like the Post Office packets at Holyhead, when running before the wind in a gale and a heavy sea, cannot employ the full power of their engines with safety, the wheels then running two or three times round without touching the water between the trough of the sea, and then being brought up all at once, are in great danger of causing some part to give way. (See Captain Rogers's evidence.)

Has the *Waterloo* performed many voyages with those paddles?—Several.

Is she regularly plying between Dublin and Liverpool?—She is; she crossed once in fifteen hours, and once in fourteen hours; and formerly with her old paddles, under no circumstances of wind or tide, could she have done it within four or five more.

What is the distance from Dublin to Liverpool?—130 miles.

Is there on board the *Waterloo* that vibration so sensibly felt in all other steam vessels?—At present there is not; formerly that was peculiarly unpleasant; and the *Waterloo's* engine, not unfrequently in rough weather, stopped entirely, and remained so for many minutes before the engineer could get her on again.

Is the engine now in her, exactly the same as formerly?—Precisely.

Were the paddles formerly in use of common construction?—Yes.

Who was the maker of the engine?—Scott, of Glasgow.

Are those new paddles strong in their mode of construction?—They may be made as strong as an anchor. Another advantage attending the use of Mr. Oldham's paddles is, that the projection outside the vessel is considerably diminished.

Do you know the breadth of the projection on the *Waterloo*?—The paddles are five feet wide; they were six and a half.

What is the effect of those paddles on a vessel going before a gale of wind in a heavy sea?—That is the time she ought to go the quickest.

Can you use the whole steaming power?—Entirely.

Have you been on board other vessels under such circumstances?—I have; but they were obliged to shut off a great portion of steam, as Captain Rogers has observed, to diminish the action of the wheels on the water, and which strained the vessel considerably.

Mercurii, 22^o die Maij, 1822.

Mr. Joshua Field, again called in ; and Examined.

Mr. J. Field.

(22 May.)

IN your experience have many of the accidents that have happened to steam vessels when used at sea been owing to the negligence of the engineers attending them?—Sometimes from that cause, and sometimes from other causes ; for instance, the vessel straining at sea.

Does not it require a very diligent attention on the part of the engineer to keep the engine constantly in good order?—Yes.

What are the principal injuries that may arise from neglect on their part?—I think the greatest evil to be apprehended is to the boiler, their neglecting to feed it properly with water, and change it frequently.

What is the consequence of that omission?—Burning the fire place, and destroying the flues.

And also burning the boiler?—Yes.

What other injury follows from the neglect of the engineer?—From inattention the engine may get loose in all its parts, which occasions a violent blow on each returning stroke, and is liable to break itself from that cause.

May it not be injured from some parts of it, for instance, the bearings being allowed to get too hot?—Yes, from the other extreme, the joints or bearings being too tight.

Any others?—It is exactly the same as other machinery in that respect.

It has been stated to the Committee that the condensed steam resting at the top of the piston is productive of danger?—That objection I consider is completely obviated.

That is in your plan, but where your plan is not adopted, how is it?—Then it is liable to that injury.

Suppose an establishment of four steam vessels, for the purpose of crossing the Irish Channel backwards and forwards every day, at all times of the year, and in every sort of weather, short of downright hurricanes, in your opinion would it be expedient to appoint a professional man to superintend the engines of those vessels, and the conduct of the working engineers?—I think it would ; in every large establishment, both public and private, where much machinery is used, it has been found necessary to have such a person ; as at the Royal Mint, and the Dock Yards, Portsmouth, particularly.

That is, a person to be over the operative engineer?—Yes, as well as having the means of making repairs. I allude to some sort of establishment, such as a smith's work-shop, lathe and other tools.

What description of inspection would you propose ; that of occasional visits, or that to be performed by a constant resident inspection?—A very frequent examination would be most likely to keep the engines in good order.

Would it not be advisable that every vessel after every voyage should be examined by an inspecting engineer?—It would render it more certain.

As the preservation of the engine and the safety of the passengers altogether depends upon all parts of the engine being kept constantly in order, could this business of inspection be executed in a certain and effectual manner in any other way than by a resident engineer?—I think not.

What is your opinion with respect to the use of copper in making boilers for engines?—I think for sea vessels it is the only material that ought to be used.

Is there any other part of the engine that ought to be made of copper?—The bolts through the bottom for fixing it should be of copper.

Should the steam pipes be of copper?—Copper is a good material for the steam pipes, from its being less brittle as well as more lasting.

Is there any part of the machinery that ought to be made of brass instead of iron?—The air pumps, the hot water pumps, and those parts most exposed to the hot salt water, should be of brass for sea vessels.

Are you of opinion that the present mode of forming furnaces on board steam vessels might be improved?—I am not aware of any, except the introduction of the revolving fire-place.

Do you think that plan of a revolving furnace might be applied to engines on board vessels?—I have no doubt of it ; I think it would be very advantageous.

Has it yet been attempted?—I believe not.

Do

Do you know what objections have been made to trying the experiment, or whether any attempt has been made so as to show whether there exist any objections or difficulties?—I am not aware of any; I never heard of any difficulty.

Would that plan require more room than the present plan of furnace?—I do not think it would; the surface of the fire-grate might be a less area than it is at present, in consequence of the advantages resulting from the principle.

Mr. J. Field.

(22 May.)

Mr. Alexander Galloway, called in; and Examined.

ARE you well acquainted with steam vessels?—Yes; tolerably well.

Have you made engines for any?—I have not made any large engines for this purpose, although I have been concerned in the engineer's company for the last four or five years; I have built them for small vessels.

Have you given the subject a good deal of consideration?—Yes, I have; both scientifically and practically.

Is it your opinion that steam vessels for sea navigation may be considerably improved?—Certainly; I consider the thing quite in a state of infancy.

Suppose a vessel of two hundred tons burthen, if such a vessel would admit of two fifty horse engines being put into her, would you prefer two such engines to two forty horse engines?—If her sectional area required the greater power, I should do so.

What do you mean by her sectional area?—I mean the area of the transverse section of the vessel, that is her breadth or beam multiplied into her depth of the draught of water. The quantity of power must always depend on the form and construction of the vessel.

If a vessel was constructed of a proper form as to the line of flotation, would you use as much power as you could put into her?—Up to a certain velocity only; because I never think of attempting to get a vessel to go more than ten miles an hour, as any greater speed would be an unprofitable application of power.

Does your answer relate to vessels going through still water?—Yes.

What would be the rate of speed which you would endeavour to obtain, supposing you were to contend against a heavy head sea, and a gale of wind directly contrary to your course?—Certainly with an opposing current or wind equal to a resistance of five miles an hour, she would only make progress at the rate of five miles an hour, if she was calculated to go through still water at the rate of ten; then under such circumstances it would be desirable to have an augmentation of power such as would enable her to go twelve in still water, but in fact with an opposing wind, as before stated, she would only go seven miles on her course.

What is your opinion with respect to the degree of strength that should be given to every part of an engine to be used at sea?—I think they cannot well be made too strong in the *actional parts*, with due regard to the measure of power.

By what means, in your opinion, may we look forward to any considerable improvement in the present plan of constructing steam vessels for sea navigation?—I should think the most certain and economical mode of effecting it would be to offer a parliamentary reward sufficient to stimulate the most experienced talent in the country; and, to render that reward more efficient, government should give all the facilities with respect to fixing and furnishing the vessels, because the want of vessels to put machinery on board for trial has been a great retarding cause to the improvement in this branch of navigation.

Are the experiments necessary for trying the merits of this sort of improvement very expensive?—Unavoidably so.

In what way would you propose that such parliamentary reward should be controlled, so that the money may be made available for its object?—The details of such a plan would, perhaps, require more consideration than I shall now be able to give it; but, I think I can, perhaps, give sufficient information upon the subject to justify a further consideration of it. I think, that if pecuniary rewards were offered for sea-going vessels, and for river navigation, fixing certain proportions of reward to the one and the other, stating the capacity of the vessel, the rate of going, and the various states of weather, which of course must be stipulated, because her progress through the water would be in different weathers variable, and therefore there must be some circumstances laid down that the vessel should be capable of being tried by: now, I think, if a Board were appointed, consisting of some clever men and experienced navigators and a few experienced engineers, to whom plans might be submitted, who might say, this is what we want in point of velocity, this is what we want in point of power and capacity; and that class of machinery that will attain these objects most effectually, both in reference to

*Mr.
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Mr.
Alex. Galloway.
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economy and safety, will be that entitled to the reward. Then I should say at once you might have a great many plans submitted to you, many of which, would, perhaps, upon the very face of them, be so obviously inconsistent and inefficient, that there would be no difficulty in saying at once this cannot be tried; but those which were thought favourably of should be tried at the expense of the engineer; and a man would pause a little before he would go and spend so much money, and he would not be satisfied to trust his own opinion; at least I, for myself, should not be satisfied with my own knowledge, but should submit it to some persons who might be able to give me advice, and when it was submitted to such a Board, if they should think favourably of it, they would say, we will fix it for you, under your direction, and if it should be, after fair and sufficient trial, adopted, the reward would be given.

Would you propose that the person suggesting such improvements should be made to bear a part of the expense?—The whole, as far as regards the machinery; that would, in my opinion, keep down idle and visionary projects.

Are there not many improvements now in contemplation which promise to be successful, that cannot well be subjected to a proper experiment without incurring a very considerable expense?—So great an expense that few individuals would have courage enough to embark in them.

What are the chief objects to which the engineers should apply their attention for the purpose of improving engines now in use for sea-going vessels?—I should think compactness in the first place; simplicity, power, and peculiar strength of construction, with a due regard to as great a reduction of the weight as possible.

With respect to wheels and paddles, is there not room for considerable improvement?—I think there is; I will instance a case I tried, as I mentioned in the early part of my observations, with internal paddles upon a vessel of 500 tons, which the engines with the ordinary paddles never did propel in still water at a greater rate than two miles per hour, which the same engines with a vertical paddle, and in the same state, and under the same circumstances, were made to propel the vessel at the rate of five miles and a half an hour; the vessel drawing ten feet of water and being twenty-eight feet beam.

What is a vertical paddle?—A vertical paddle is one that always retains its vertical position as it enters and quits the water upon its edge.

Are the present engines in your opinion very defective in consequence of their great weight?—I think they are so far defective as weight is an injury to a vessel; but they are also defective inasmuch as they take up that room which can be ill spared. On land situations it was never a very important object with an engineer to consider the least possible space that he could put an engine into; but on board a vessel it is a great object to gain compactness.

Then it becomes necessary so to contrive and form the vessel as to get rid of that great weight which has hitherto been found injurious?—I think so; the class of engine, in my estimation, that will ultimately be found the best calculated for steam vessels will be rotary engines.

Will you state the reason?—The reason why I think that rotary engines will be best calculated for steam vessels is, that you would obtain circular motion for the paddles directly from the steam cylinder, without the intervention of any machinery whatever.

Is much of the power of the steam lost, at present, by the various combinations of the machinery?—Certainly.

Are many of the accidents that occur to be accounted for in the same way?—In proportion to the multiplication of the parts of steam engines, they are liable to breakage and accidents in this way.

You were examined some years ago on the subject of high pressure engines?—I was.

Your opinion at that time was against the use of them on board steam vessels, do you entertain at present the same opinion?—Certainly not, as to the inexpediency of using high pressure engines.

What circumstances have induced you to change your opinion?—The circumstances that have induced me to change my opinion are, that the public are now much more familiar with steam engines than they were at that period, there are no false fears on the subject now, and the advantages that have resulted from their use have been so many and so conspicuous, that a man would now no longer consent to give up the use of a steam engine in a vessel, because an accident might happen on board, than he would give up a carriage because the axle-tree broke; for ships of war I should have no hesitation at all in saying, that a high pressure engine would

be

be the best, because there would be good discipline and regulation, which would ensure their safety.

Are the high pressure engines much in use?—In America they are, but not at all in England in steam vessels, to my knowledge.

Are they able to construct them in such a way as to prevent accidents?—I think they may be rendered considerably safer than we have any example of at present.

What are the general advantages of high pressure engines?—The great advantage is, that they produce compactness, an immense power in a small compass, and comparatively little weight.

Are you of opinion that a high pressure engine may be so constructed as to be made safe?—I think so.

Supposing an establishment of four steam vessels to perform the public service of carrying the mails between Holyhead and Howth, which requires one to sail from each port every morning in all sorts of weather, and throughout the year, are you of opinion that such vessel ought to be left entirely to the charge of the working engineers that are on board them?—Certainly not; they would indispensably require on each side a superintendent engineer.

Do you mean a professional engineer?—I mean a man who would be acquainted with the general theory of the subject, and intimate with the practical operation of that theory, so as to be able to perceive casualties, and to see the probability of breakage and injury, when perhaps it would altogether escape the observation of a mere working man.

You mean then a person who has been in the habit of superintending the practical operations of engineering, and not a mere working engineer?—Certainly.

Might not one inspector be sufficient, supposing the arrangements to be that the packet sailing from Holyhead should return the next day, so as to confine all the packets as much as possible on the Holyhead side?—I should consider that one on either side would be of great service, yet I think one on both sides would be of much greater; but I consider it would, perhaps, for a first attempt, be quite sufficient that one of such individuals should be placed on either side.

In other great establishments, where much machinery is in use, is it not the practice to have inspecting engineers of the description you have mentioned?—Invariably so, and also the means of correcting any part of the machinery that may suddenly require repair.

You allude to forges and other means of repair?—A turning lathe and all sorts of means which an engineer requires in his manufactory to perform work of that sort.

Is not the time and attention of the operative engineer sufficiently taken up by the business belonging to the voyage?—Sufficiently so; it would be most unwise to engage his attention in any thing else.

Would not such an arrangement of constant inspection, contribute essentially to the preservation of the machinery, and thereby to a saving of expense?—I should do it as much for the sake of economy as any thing else.

Would it not also contribute to the safety and convenience of the passengers?—Certainly, to their convenience; I should think to their safety, as far as securing the use of the engines in the vessel under all circumstances.

Mr.
Alex. Gallaway.
(22 May.)

Sabbati, 1^o die Junij, 1822.

Mr. Michael Faraday, again called in; and Examined.

WHAT is the temperature most favourable to crystallization of a water concentrated by evaporation?—The lower the temperature the more favourable for the deposition of the salt.

At what degree of temperature and saturation do the different salts contained in sea water first begin to be deposited?—If a certain quantity of sea water be taken, 1,000 parts for instance, the following are the points of deposition. The boiling point of the water at first is nearly 214° Fahrenheit; when 701 parts of steam have been driven off, the remaining 299 parts begin to deposit sulphate of lime, the boiling temperature then being 217°F; when 898 parts have been evaporated, the remaining 102 parts begin to deposit common salt, and boil at 228°F; if all the water be evaporated, about 30 parts of salt remain. These are the points which occur in a close vessel at the pressure of the atmosphere. That which relates to the sulphate of lime differs from the estimation I before gave, but I have made the last experiment very carefully, and am willing to trust to it.

Mr. M. Faraday.
(1 June.)

Mr. M. Faraday.

(1 June.)

What is the temperature at which sulphate of lime begins to be deposited?—217° of Fahrenheit, very nearly.

Would a dry holly or thorn bush introduced, if practicable, into the boiler, take off a part of the crystallization which would otherwise adhere to the bottom of the boiler?—I should be afraid only a small part, too small to be of any importance; the agitation of the water in the boiler from ebullition, would prevent the crystallization taking place on the holly bush as a nucleus, but the crystals would be formed throughout the whole mass, and would fall, by their gravity, to the bottom of the boiler.

Would any known extraneous matter put into the boiler have the effect of attracting the sulphate of lime, in lieu of its attaching itself to the sides or bottom of the boiler?—I am not aware of any such substance in the circumstances of a steam engine boiler.

Would the filling a boiler with river water in the first instance, on the departure of a vessel for a voyage of seven or eight hours, be of any importance in obviating the difficulties alluded to?—That would depend upon the whole quantity of water used for the voyage. If the quantity taken out in the boiler were small, compared with the quantity to be added from the sea, the good effect would of course be small also.

Supposing the consumption of water to be at the rate of forty-five hundred weight per hour, and the voyage to last seven or eight hours, how much concentration would take place?—I cannot answer the question without knowing the quantity of water left in the boiler; but such a consumption for eight hours would reduce 513½ cwt. or nearly 26 tons of sea water, to the state in which it would begin to deposit sulphate of lime, or 400½ cwt. (about 20 tons) to the state in which it would begin to deposit common salt. The remaining concentrated portion would weigh, in the first instance, 153½ cwt. nearly, and in the second 40½ cwt. nearly.

In what manner is the muriatic acid produced in boilers of steam vessels?—In the evidence I have read, mention is made of crusts of salt having formed on the bottoms of boilers; the interposition of these crusts, which are very bad conductors of heat between the boiler and the water, prevents the free transmission of heat that ought to take place; and the bottom of the boiler, with the under side of the crust, is in consequence heated to a higher temperature than the water itself; this undue accession of heat increasing with the thickness of the crust; when the elevation of temperature reaches 270° or 280° and upwards, all that portion of muriate of magnesia included in the crust so heated will be decomposed, and its muriatic acid evolved in a free state; also, if by carelessness the sea water in a boiler, having the flue passing through it, should be suffered to sink by evaporation below that flue, any salt deposited on the upper surface of it would then be liable to an elevation of temperature much above 270° or 300°, and would in consequence have the muriate of magnesia contained in it decomposed, and the muriatic acid evolved.

Have you turned your attention to the different qualities of coal, in respect to their tendency to fire spontaneously, when put together in large heaps?—I have not had an opportunity of witnessing the effect, but the general chemical principles I am acquainted with.

Have the goodness to state them?—The inflammation of the coal in such circumstances, almost always, if not quite always, depends on the action of moisture and air on the pyrites they contain; when the pyrites in the coal are moistened and exposed to air, they are decomposed with the production of heat, and portions of the sulphur contained in them, with gaseous combustible bodies, being liberated, they inflame and produce the ignition of the coal; the commencement of the combustion I believe always takes place in this way.

That is without coming into contact with any ignited body?—Yes.

Does this tendency to firing spontaneously depend upon the quantity of pyrites in the coal?—It depends partly upon the quantity, and partly upon their state; some kinds of pyrites are more liable to decomposition than others.

Do the different kinds of coal differ very much, in respect to the quantity of pyrites they contain, and to the different kind of pyrites?—I believe very much, but I have not an accurate knowledge of the varieties of coal raised in this country.

Is the spontaneous firing of coal a circumstance likely to happen frequently?—That depends entirely upon the circumstances of the quantity and the quality of the coal, the degree of dampness, and the degree of heat.

Then in selecting coals for the use of steam vessels at sea, great care should be taken first of all in selecting the coals, then in putting them together in a dry state, and then that they are not unnecessarily exposed to a high degree of temperature?—

Yes;

Yes; but I am not sufficiently aware of the quantity, and other circumstances of coals generally stowed in vessels for long voyages, to say whether the precautions which would be necessary at the pit mouths are requisite on board the vessels; if the quantities stowed at once are but small, and the coals are continually, day by day, changed, and the temperature moderate, I should think there was very little probability of injury.

Have you ever known any instance of a spontaneous ignition of coals in a steam vessel?—No, I have not; I may remark, that coals, which in common circumstances would have no tendency to heat and inflame spontaneously, would have a tendency at a higher temperature; but it would be very easy in the coal boxes on board of vessels to ascertain the general temperature of the mass of coals, by having an iron tube across the coal box, into which a thermometer could be introduced, when if any increase was observed, it would be evident that there was a tendency to heat and inflame.

Royal Institution, May 7th 1822.

THE following Remarks are intended to accompany the evidence I have been called upon to give before the Committee on Holyhead Roads. The nature of an examination will not always admit of the information required being put into the best form; and as some rather refined sources of probable injury have been stated, and other sources insisted on, which have not been generally noticed, it will be of advantage to have the whole placed in one connected view.

With regard to the composition of sea water, the following numbers are very nearly correct, and accord with the best analysis. Its specific gravity varies a little in different parts of the ocean, from the vicinity of mouths of rivers, ice, evaporation, and other causes, but may be estimated as a mean at 1027, pure water being 1000. When of a specific gravity of 1027.2, being such as I used in my experiments, one cubic foot of it weighs 1026.265 ounces avoirdupois; and contains,

	Ounces.
Common salt	25.762
Muriate of magnesia	3.282
Sulphate of magnesia	2.212
Sulphate of lime	1.013
	32.27

besides small quantities of some other salts, which however are in proportions too minute to be of any consequence.

When any of these salts in their pure and separate state are dissolved in water, and left in contact with iron, or are boiled with wrought iron in a close vessel analogous to a steam-engine boiler, corrosion of the iron takes place, and an oxide of that metal is formed. The effect even takes place at common temperatures, and is much increased by the free access of air. In consequence of this power of corrosion, which belongs also to the solutions when mixed, as they are in sea water, all iron boilers in which sea water is used will be subjected to a much more destructive process than when fresh water is used in them, notwithstanding any degree of care that may be given to them; and if care is not given, then other serious causes of injury arise, which greatly add to the bad effects necessarily attendant on the use of sea water.

With regard to the prevention of the corrosive and injurious effects of sea water in such circumstances, I am not aware of any means that can be offered for the purpose which will embrace the whole; but from experiments made in the laboratory, a part of the evil appears to be more manageable, and capable of a remedy: and though perhaps the engineer may not find the means so available, or the advantages so important, as to make it worth while applying this remedy in the large way, yet it is important that his attention should be directed to it, that a true estimate may be formed of the circumstances connected with it.

Of the salts contained in sea water, the muriate of magnesia is that which acts most powerfully on the iron of the boiler. I boiled clean metallic iron in solutions of muriate of soda or common salt, muriate of lime, muriate of magnesia, and sulphate of magnesia, for about an hour; corrosion of the metal in all the solutions had taken place, and oxide of iron had been deposited; but the portion deposited in the muriate of magnesia was by far the greatest; and further, when the solution was filtered, it was found to hold a portion of iron even in solution, an effect which was not produced by any of the other salts.

Hence it is evident that the muriate of magnesia is a much more injurious salt than

Mr. M. Faraday.

(1 June.)

than any of the others existing in sea water. At the same time I am not able to say what portion of the whole injury arising to a boiler by the use of sea water in it is due to this salt. It will be seen from the table of salts given, that its quantity is only about one eighth part of that of the common salt; so that though its powers are great, they will in part be restrained by the smallness of its proportion. One thing, however, is worthy attention; namely, that the corrosive effect due to this salt may be prevented, whereas the others, as far as I know, are intractable in this respect. The muriate of magnesia is a salt composed of muriatic acid and magnesia; and it owes much of its corrosive power over the iron to the weakness of the affinity existing between its elements. This, however, enables other bodies to decompose it, producing substances that, comparatively, are inert on the iron. If for instance, lime, or potash, or soda, be added to muriate of magnesia, a muriate of lime, or of potash, or of soda, is formed, all of which are found by experiment to have less action on the metal than the magnesian salt, and magnesia is deposited. Hence, as regards the muriate of magnesia, the excess of corrosive power due to it above the other salts may be destroyed; but it is for the practical engineer to state from experience, either already in his possession, or to be had by observation, whether it may be done advantageously. The points for consideration, I presume, are, What quantity of the corrosive power compared with the whole quantity due to the sea water would be destroyed? Would any injury arise from the deposition of the magnesia that would more than counterbalance the advantage? Can the corrective agent be introduced with facility into the water? Would any inconvenience or injury, at present unknown or unforeseen, arise from the use of it?

I have ventured to put more stress on the effect of the muriate of magnesia when in solution, and on the means of correcting it, than it may perhaps seem to deserve; but I thought it my duty, when called upon for information, to give all I could; and I think the attention will not be misapplied that may be given to determine the quantity of effect due to this salt, and the possibility of correcting it.

The quantity of muriate of magnesia in a cubic foot of sea water being 3.28 oz.; the following are the equivalent quantities of the other substances concerned. It would require 1.64 oz. of dry quick lime, or 2.78 oz. of pure potash, or 4.1 oz. of dry pearlash to decompose it; with the two first substances 1.14 oz. of magnesia would be deposited, and with the third 2.43 oz. of carbonate of magnesia.

When copper is substituted for iron in the above experiments the injurious effects are very much diminished; and it would probably be found, ultimately, that copper boilers were the most economical, and certainly the least troublesome. It must however be constantly remembered, that all mixture of copper and iron, by which I mean the use of copper and iron in contact with each other, or indeed of any two different metals, as of iron and brass, or even copper and brass, should be avoided as much as possible in those parts to which the salt water has access. When two dissimilar metals are in contact with each other, and also with sea water, a voltaic effect is produced, which occasions rapid corrosion of the most oxidable metal at the points of contact, as well as a lesser effect over its whole mass; and the action will be stronger from the circumstance of the temperature being high. Hence in the pumps or tubes connected with them and with the boiler, and in every part where the salt water passes, such combinations of dissimilar metals should as much as possible be avoided.

When a boiler charged with sea water is heated, and steam sent off from it, the following effects take place within:—the water becomes more and more concentrated, acting at the same time more powerfully on the iron. When the concentration arrives at a certain point, the sulphate of lime begins to deposit, and form crusts on the bottom and sides of the vessel. Continuing the evaporation, the water becomes so much diminished in quantity as to be unable to hold even the common salt in solution, and it begins to deposit. During the whole of this evaporation the temperature of the fluid has been rising, and it requires more heat to make it boil than it did before. Ultimately, if the operation be continued, the salts become dry in the boiler, the temperature rises, and when it attains from 270° to 300°, the muriate of magnesia is decomposed, its earth or magnesia left free, and its muriatic acid sent off in the state of gas.

Hence, it is evident, that boilers using sea water are liable to certain kinds of injury, through ignorance or carelessness, which by a knowledge of the circumstances, and attention, may be prevented. If the evaporation is carried on so far as to cause the deposition of sulphate of lime, it will tend to form crusts on the sides and bottom of the boiler; and though the addition of a fresh portion of sea water will

will at first dissolve this, yet when the evaporation is continued it will add to the quantity of sulphate which is thrown down by the concentration. The same is the case with the common salt; upon the evaporation of a certain portion of steam from the water the salt would be deposited, and would tend, with the sulphate of lime, to form crusts at the bottom of the boiler.

One bad effect produced by this state of things is the burning of the bottom of the boiler and the flues. The heat in traversing the bottom of the boiler to reach the water, has also to pass through the crust of deposited matter, and this being of bad conducting powers obstructs its passage, and causes its accumulation in the metal itself, which of course suffers from combustion more rapidly in proportion to the elevation of temperature: at the same time, the flame and smoke, not being able to, give off their heat to the already heated metal, pass on into the flues at a temperature far above what they ought to do, and burn them.

Another evil is, that less steam is raised; for the crust acting as a barrier between the fire and the water, prevents the latter from receiving that accession of heat which it ought to do; and the quantity of steam produced is proportionably less. Hence there is a waste of fuel in getting steam, or else there is a want of steam, and at the same time there is a burning of the boilers.

A third source of injury suggests itself, which, though I am not aware it has been observed in practice, well deserves pointing out, that if any effect should arise from it, it may be distinguished and guarded against. I refer to the decomposition of the muriate of magnesia by a heat approaching 300° F. This effect can never take place whilst the salt remains in solution, and it is the most soluble of any of the salts in sea water. But whenever any portion of the common salt is rendered dry, and caked, it is then possible that muriate of magnesia should be decomposed, and its muriatic acid liberated in a free state. Thus, if from the concentration of the sea water a crust of common salt and sulphate of lime had formed on the bottom of the boiler, it would act as before mentioned, by preventing the transmission of the heat through it, which would consequently accumulate on the lower side, and any portion of muriate of magnesia contained in the crust would then be decomposed; its free acid partly acting on and combining with the iron at the bottom, and partly passing into the water, and from thence wherever the water or steam passed. Again; I believe there are instances known where the water has been suffered to sink below the level of the upper surface of the flue, or furnace, which sometimes passes through the boiler; in such case, any portion of muriate of magnesia left on the top of this flue would be heated, and if sufficiently so, would be decomposed as before.

From the possibility, therefore, that this highly injurious effect may take place, I think it very desirable, where engineers have cause to suspect carelessness in the attendance of boilers using sea water, that they should look for the effects that are to be expected. These, beside great internal corrosion of the bottom, may even extend to the steam passages, inasmuch as the acid liberated is volatile; and if the water in the boiler is found to hold iron, not in a state of suspension only, but in actual solution, it would be well to compare its quantity with that which sea water by mere boiling may be made to take up.

The evident remedy for the injuries that may arise from the concentration of the sea water below the point at which it deposits salt, and the only one that suggests itself to me, is the removal of the water in the boiler before it acquires this undue degree of concentration. In doing this, there can be no difficulty; and I should conceive it may be done in such a way as to occasion very little loss of heat by the water thrown out. The practicability, however, of such a plan, may be better judged of after a consideration of the various points of deposition and temperature, and the quantities of water that may be abstracted as steam before their occurrence. Sea water in a close vessel, but at common atmospheric pressure, boils at 214° F. very nearly. Suppose 1,000 parts of such sea water, and the evaporation continued until the sulphate of lime began to deposit: this took place in my experiments, when 701 parts of steam had been driven off, and when consequently 299 parts of salt and water remained. The temperature of the water in ebullition was then 217° F. As the evaporation went on, more and more sulphate of lime was deposited, and the thermometer rose until the temperature was 228° F. when common salt began to deposit, and when 898.3 parts of steam had been abstracted. Still continuing the ebullition, salt and sulphate of lime were deposited in considerable quantities, and the temperature still rose, because of the concentration of the muriate

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of magnesia in the solution. The muriate of magnesia was not however deposited until the whole was dry, being retained in solution till the last.

Hence it follows, that taking 1000 parts by weight of sea water, 701 parts may be converted into steam before any deposit at all takes place in it; and that 898.3 parts of steam may be obtained before any common salt will be deposited. It also follows, that sea water, boiling at common pressure at less than 217° F. is not depositing any thing; and that boiling at temperatures below 226° F. it is not depositing common salt.

It is now easy to ascertain the propriety of changing the water in a boiler. If the water left in it at the end of the voyage is less than three tenths of the whole quantity introduced, it will deposit sulphate of lime; and if it is less than one tenth, it will deposit common salt; and the more the diminution below these quantities, the greater the depositions. It is also evident, that with a small boiler intended to supply the same quantity of steam as a larger one, the necessity of changing the water will be greater and more frequent.

I am not aware of all the circumstances that influence the quantity of water necessary to be added to that with which the engine is first set to work; but I should presume both they and the quantity are variable. At sea, where every portion of water introduced into the boiler from the sea is the means of introducing a fresh portion of salt, I should think it would always be an object to supply the boiler as much as possible from the condensed water of the steam that has passed through the engine; and the more perfectly this is done the less the necessity for any precautions respecting the deposition of salt in the boiler. As, however, the evidence proves, that even in short voyages, lasting but a few hours, the water in the boiler has been so concentrated as to deposit abundance of salt, it is evident that there is a necessity for changing it, by allowing the escape of the concentrated water, and introducing fresh portions.

The means of doing this are in the hands of every engineer, and I should think might be so applied as to occasion very little loss of heat. The indications, when it may be necessary, may be founded both on the temperature at which the water is boiling, and on its specific gravity. With regard to the latter, I think the best instrument the man could have would be the hydrometer, with one, or at most two marks upon it, the one to indicate the density of the water when it begins to deposit common salt, and the other, the density perhaps when it begins to deposit sulphate of lime. Regard must of course be had to the temperature, but that is a point easily arranged.

The indications by temperature would be obtained by inserting a thermometer into the boiler; certain precautions, however, would be required in its application. In the first place, it is essential that the thermometer dip into the water, for the atmosphere of steam which is above the surface of boiling sea water, or of, I believe, all saline solutions, is not, at any pressure, at the same temperature as the water itself, but always lower, and the more so as the water is more concentrated. In the second place, the temperature both of the water and steam will vary with variations of the pressure in the boiler; but this, when ascertained by the steam gauge, easily gives the correction, which, added to the temperatures I have given, will give the temperatures for the various points, in the circumstances of the altered pressure.

When the consumption of water by a steam engine, or rather, I would say, its waste, for I mean the portion that is lost by the steam-vent, and in other ways, is known, it is easy to ascertain whether it would be advantageous to go to sea at first with fresh water in the boiler. If this precaution sufficiently balances the concentration caused by the loss of steam, it is effectual; if not, it only lessens or retards it. The propriety of selecting such waters as contain no earthy matter, as carbonate or sulphate of lime, or any substance which may deposit in and clog the boiler, is evident from the effects produced in many of the steam-engine boilers in Cornwall.

Proust has lately demonstrated the existence of mercury in sea water. The quantity of this substance contained in it is probably far too small to cause any injury to steam engines at sea. At the same time, it is matter of interesting, and perhaps useful inquiry, to ascertain whether it may not have an effect. The high temperature of parts of the engine would favour its action, and perhaps make the existence of that substance sensible in those situations where till now it has escaped observation.

Coals.—The proper selection and state of the coals used on board steam vessels, especially when one very great object is to secure a regular and short passage, whatever

whatever the state of the weather may be, is very important. I am not, however, sufficiently acquainted with the varieties of coal raised in this country to state the particular qualities which distinguish them, or to point out the best for this particular purpose. As however it is not practicable to have access to any coal at pleasure, all that can be done is to ascertain the qualities of those within reach, and choose the best.

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All coal containing pyrites should be rejected, or at least the purest kind selected. Mention has been made before the Committee of the spontaneous inflammation of coal on board a steam vessel. This is an effect which, I believe, not unfrequently takes place at the pit mouth, and when produced, it is due to the pyrites or sulphuret of iron the coal contains. When large masses of coal containing this substance are exposed to air and moisture, those agents sometimes act on the pyrites, causing the oxydation of the iron in them, and liberating sulphur and combustible aerial products; and the heat produced by this action accumulating in the mass, sometimes rises so high as to fire the sulphur and sulphuretted gases, and these inflame the coal, so that the combustion of the mass is produced without the approximation of any ignited body.

The coals in steam vessels are generally, I believe, put into boxes at the sides of the place where the engine stands, and I do not think that with moderate caution they can fire there; *i. e.* provided the communication between them and the furnaces be prevented; for their masses are comparatively so small, and they remain for so very short a time together undisturbed, that it is not probable the mere action of air and moisture on the pyrites they contain should inflame them. It is true, the elevation of temperature in the place in which they are stowed, caused by the vicinity of the furnaces, will be favourable to such an effect; but I do not think its influence would be dangerous, except with very bad coals indeed. It would however be easy at all times to know the state of the coals, by having one, two, or three iron pipes going across the boxes in which they are put; any tendency in the coals to heat would heat the pipes also, and might be detected by a thermometer being placed in them.

The pyrites contained in coal have probably a more injurious effect in steam vessels, by the action they give rise to on the bottom of the boiler, and on the iron of the furnace and flues. Whatever part the sulphur or sulphureous vapours come in contact with, it attacks, and causes its destruction; hence a rapid and premature decay. They tend also to increase the quantity of slag in the furnace, and thus embarrass the grate; and this latter effect is increased by the mixture of dirt with the coals. I am not sufficiently acquainted with large furnace fires to know the most advantageous mode of managing them, but there are evidently some curious and apparently conflicting circumstances, which require attention. Were coal a pure combustible matter, there would be no difficulty in saying, that, generally, the whole should be burnt, and made to produce the highest heat possible; but being a mixture of pure combustible matter with earthy substances, oxide of iron, and generally pyrites, in greater or smaller quantity, it becomes a point for consideration whether it shall be made to produce the highest possible heat in the furnace, or a moderated one. With the highest heat the residue forms a glassy slag, which rests on the grate, and chokes the apertures; with a moderated heat the slag is not formed, but the ashes that fall through the grate contain much combustible matter. In practice, I believe, it is found advantageous to preserve a stratum of clinkers, or broken slag, on the bars of the grate, which preserves them cool, and diminishes, to a certain extent, their combustion and decay; and I have seen furnaces in which, by this means, large and powerful fires had been going on for years over very thin bars, without injuring them. Where however the coals are liable to vary in quality, the practice must vary also. But this much is certain, that the clinkers or slag will be in proportion to the earthy and ferruginous matter in the coal, and to the heat to which it is exposed; and also that the presence of pyrites considerably facilitates and hastens the formation of slag; so that it will be produced at a lower temperature than if no pyrites were in the coal: and consequently, it results, that whenever the best and most certain effect is required in a steam vessel, coals should not be used indiscriminately, but a selection made from among such as can be obtained, those being preferred which contain least pyrites and earthy matter.

M. Faraday.

Mr. Joshua Field, again called in ; and Examined.

Mr. J. Field.

(1 June.)

HAS any improvement been adapted with respect to the chimnies of steam vessels?—I believe nothing further than the making them elliptical, so as to oppose less resistance to a head wind.

Have chimnies of this description been put up on board any vessels?—There are two at present working with elliptical chimnies; the *Victory*, to Margate, and the *Rob Roy*, between Dover and Calais.

Are they found to answer?—They consider that the vessels go head to wind better than without them.

What is the common diameter of a circular chimney for two forty-horse engines?—About two feet six.

What is the power of the *Victory*?—Two twenties.

What is the greatest breadth of her elliptical chimney?—That I cannot exactly state, but the dimensions are determined by giving the same area.

Mr. Bryan Donkin, again called in; and Examined.

Mr. B. Donkin.

REFERRING to your evidence of the 3d of May, concerning the inspection of steam vessels, in which you say, that you think the vessels ought to be inspected once in three, or at least once in six months, what description of inspection would you recommend, supposing that the number of vessels employed were four, and that two of them were to go to sea every day throughout the year, to perform a sea voyage of fifty-four miles?—Considering the property necessarily involved in such an establishment, and the situation at which the business would be carried on, at a distance from any professional engineers, I should recommend a resident engineer, who should examine the vessels daily.

Is it not the practice, where a great extent of machinery is in use, to have this sort of inspection in other concerns?—In a variety of concerns it is, such as canals and docks, and large manufacturing concerns, they have men conversant with the particular machinery employed.

APPENDIX.

LIST.

- No. 1.—LIST of all the Steam Boats built since 1811; showing their Tonnage, and the Power of their Engines; the Names of the Builders and of the Engine Makers, the Date of their being launched, and also the Station where they ply - p. 197.
- No. 2.—Return of the Number and average Length of the Voyages made by His Majesty's Packet Boats between Holyhead and Howth, for the year ending the 1st June 1822 - - - - - p. 203.
- No. 3.—Statement of the Number of Passengers, Carriages and Horses, carried in His Majesty's Packet Boats between Holyhead and Howth, from the 1st January 1819 to the 31st December 1821, both included; together with Lists of the accustomed Charges on the same - - - - - p. 204.
- No. 4.—A Return of the gross annual Produce of the Postage on Letters between Holyhead and Howth - - - - - p. 205.
- No. 5.—A Return on Estimate of the gross annual Produce of the Fares charged on board the Holyhead Packets for Passengers, Carriages, Horses, Parcels and other things - ibid.
- No. 6.—A Return, showing in what manner the Luggage of Persons arriving at Holyhead by the Post Office Packets is conveyed to the Custom House and examined, and of what Charges are made for Portage - - - - - ibid.
- No. 7.—Queries circulated by the Committee - - - - - p. 206.
- No. 8.—Answers to the Circular of Queries, relating to Steam Boats - - - - p. 207.
- No. 9.—Evidence of Mr. William Brunton on Rotary Furnaces - - - - - p. 238.
- Plate I. } On the construction of Mercantile Ships, referred to by Sir Robert Seppings in
 Plate II. } his Answers to the Circular of Queries - - - - - to face p. 220.
 Plate III. }

Appendix, No. 1.

LIST of all the Steam Boats built since 1811; showing their Tonnage, and the Power of their Engines; the Names of the Builders and of the Engine Makers, the Date of their being launched, and also the Station where they ply.

Sir,

Lambeth, June 15, 1822.

I HAVE herewith enclosed the List containing all the Steam Vessels I have been able to learn the particulars of. There are still a few I have seen or known of, on the Clyde and other rivers, but being unable to learn their dates, builders or engineers names, I have omitted them.

I am, Sir, your obedient Servant,

Sir Henry Parnell.

Joshua Field.

When Built.	NAMES OF VESSELS.	Tonnage.	Nominal Power.			WHERE EMPLOYED.	Where, or by whom Built.	NAMES OF ENGINEERS.
			Total Horses Power.	or,	Horses Power.			
1811.	Comet -	25	4	-	-	Glasgow and Helensburgh Baths	J. Wood & Co. Port Glasgow	Mr. Bell.
—	Elizabeth -	40	9	-	-	First on the Clyde, now on the Mersey	Ditto -	Mr. Thomson.
1813.	Clyde -	69	14	-	-	Glasgow and Greenock	-	Mr. Robertson.
—	Margery -	70	14	-	-	On the Clyde; and in 1815 sailed from Leith to London; and in 1816 to the Seine	Ditto -	-
—	Glasgow, now the Thames	74	16	-	-	Glasgow and Largs; in 1815 sailed round the Land's End to London, and plied between Margate and London	-	Ditto.
—	Orwell -	28	4	-	-	Bristol and Bath -	J. Wood & Co. -	Mr. Cook.
—	—	60	12	3	6	Ipswich and Harwich -	Bristol.	—
—	Princess of Orange -	20	3	High Pressure	4	Norwich and Yarmouth	Lepingwell, Yarmouth -	Agg & Ker, Norwich.
—	—	40	8	Horizontal.	—	Glasgow and Gourcock	-	Wright, Yarmouth.
1814.	Stirling Castle -	60	12	-	-	Inverness and Fort Augustus	A captured French Row Boat	Boulton & Watt.
—	Lady of the Lake -	76	20	-	-	Leith and Stirling; 1816 crossed to the Elbe, and plied between Hamburg and Cuxhaven	Clyde -	Mr. Bell.
—	Morning Star -	100	26	-	-	Leith and Alton.	Gray, Kincardine -	Cook, Glasgow.
—	Phoenix -	25	4	High Pressure	—	Norwich and Yarmouth	Wright, Yarmouth -	Wright, Yarmouth.
—	Eagle (double vessel) -	40	6	High Pressure	—	Went up the Seine in 1815	-	Watts, Yarmouth.
—	Richmond -	60	10	-	-	London and Richmond	-	Wright.
—	Persuance -	60	14	-	-	Newcastle and Shields	Lepingwell, Yarmouth	Maudslay & Co.
—	—	—	—	—	—	—	Boul, South Shore	Crowther, Newcastle.
1815.	Caledonia -	103	32	2	16	(First on the Clyde; and in 1816 came round the Land's End to London; 1817, was refitted by Boulton and Watt; went up the Rhine, and in 1818 to Copenhagen.	Wood & Co. -	Greenhead & Co.
—	Argyle -	88	28	2	14	Glasgow and Inverary -	-	Boulton & Watt.
—	Oscar -	70	12	3	16	Glasgow and Greenock	Wood & Co. -	Greenhead & Co.
—	Swift -	18	3	-	-	Newcastle and Shields.	Ditto -	Robertson.
—	Hope -	45	6	2	3	Chatham and Sheerness	Bristol -	Johnston.

1816.	Regent	113	24	2	12	London and Margate; destroyed by fire in 1817	Courthope, Rotherhithe	Maudslay & Co.
-	Majestic	90	24	-	-	London and Margate; now London and South-end	Court, Ramsgate	Dixon, London.
-	Congo	100	20	-	-	Intended for the Congo expedition	King's Yard, Deptford	Boulton & Watt.
-	Caledonia	80	12	-	-	Selby and Hull	Smart, Dundee	Robertson.
-	Neptune	88	40	2	20	Glasgow and Inverary	Wood & Co.	Cook.
-	Sir Wm. Wallace	95	32	2	16	Newhaven and Kinghorn	- Ditto -	Ditto.
-	Albion	92	22	-	-	Largs and Glasgow	- Ditto -	M'Arthur.
-	Ætas (double vessel)	75	20	-	-	Across the Mersey at Liverpool	Liverpool	Fawcett & Littledale.
-	Eagle	70	20	-	-	Newcastle and Shields	Doeg, Newcastle	Boulton & Watt.
1817.	Tug	95	32	2	16	Leith and Stirling, and towing	Wood & Co.	M'Arthur.
-	Defiance	50	14	-	-	Glasgow and Loch Gilphead	- Ditto -	Robertson.
-	Marion	70	14	-	-	Loch Lomond	-	Napier.
-	John Bull	75	15	-	-	Gainsborough and Hull	Moody, of Thorn	Butcherly Company.
-	Humber	80	12	-	-	- Ditto -	Brown, Perth	Robertson.
-	Britannia	70	15	-	-	London and Southend	Titterton, of Stockwith	Butcherly Company.
-	London	70	14	-	-	London and Richmond	Searle, Westminster Bridge	- Ditto.
-	Sons of Commerce	80	20	-	-	London and Gravesend	Lalort, Blackfriars	- Ditto.
-	Enterprise	30	5	-	-	Newcastle and Shields	Cockburn, St. Peter's Quay	Robson.
1818.	Rob Roy	100	30	-	-	Glasgow and Belfast; now Dover and Calais	Denny, Dumbarton	Napier.
-	Lady of the Shannon	90	20	-	-	Glasgow and Gourock	Scot & Sons, Greenock	Cook.
-	Marquis of Bute	60	14	-	-	London and Margate	Wood & Co.	Robertson.
-	Engineer	315	70	2	35	Gone to South America	D. Breut, Rotherhithe	Maudslay & Co.
-	Rising Star	400	70	2	35	London and Margate	- Ditto -	- Ditto.
-	Favourite	160	40	2	20	- Ditto -	Lalort, Blackfriars	Boulton & Watt.
-	Victory	180	40	2	20	Gainsborough and Hull	Evans, Rotherhithe	Dixon.
-	British Queen	75	20	-	-	- Ditto -	Smith, Gainsborough	Burnton, Birmingham.
-	Albion	75	24	-	-	Southampton and Cowes	- Ditto -	Horley Company.
-	Cobourg	75	24	-	-	Hull and Barton	- Ditto -	- Ditto.
-	Selby	80	24	-	-	Newcastle and Shields	Foster, Selby	Overton & Smith.
-	Speedwell	40	10	-	-	Liverpool, Isle of Man, and Greenock; burnt in 1821	Dixon, South Shore	Robson.
1819.	Robert Bruce	155	60	2	30	Holyhead and Dublin; now London and Calais	Scot & Sons, Greenock	Napier.
-	Talbot	156	60	2	30	Liverpool and Dublin	Wood & Co. Port Glasgow	Ditto.
-	Waterloo	210	60	2	30	Glasgow and Helensburgh	Scot & Sons	Cook.
-	Robert Burns	73	24	-	-	- Ditto -	Wood & Co.	Napier.
-	Port Glasgow	70	16	-	-	-	- Ditto -	Murdock.

(continued)

When Built.	NAMES OF VESSELS.	Tonnage.	Nominal Power.			WHERE EMPLOYED.	Where, or by whom Built.	NAMES OF ENGINEERS.
			Total Horses Power.	σ.	Horses Power.			
1812.	Comet -	25	4	-	-	Glasgow and Helensburgh Baths	J. Wood & Co. Port Glasgow -	Mr. Bell.
—	Elizabeth -	40	9	-	-	First on the Clyde, now on the Mersey	- Ditto -	Mr. Thomson.
1813.	Clyde -	69	14	-	-	Glasgow and Greenock	- Ditto -	Mr. Robertson.
—	Margery -	70	14	-	-	On the Clyde; and in 1815 sailed from Leith to London; and in 1816 to the Seine	- - - -	- Ditto.
—	Glasgow, now the Thames	74	16	-	-	Glasgow and Largs; in 1815 sailed round the Land's End to London, and plied between Margate and London	- - - -	-
—	Orwell -	28	4	-	-	Bristol and Bath -	J. Wood & Co. -	Mr. Cook.
—	—	60	12	2	6	Ipawich and Harwich -	Bristol.	—
—	—	20	3	Horizontal.	—	Norwich and Yarmouth	Lepingwell, Yarmouth -	Agg & Ker, Norwich.
—	Prince of Orange -	40	8	High Pressure	4	Glasgow and Gourock	A captured French Row Boat Clyde -	Wright, Yarmouth.
1814.	Stirling Castle -	60	12	-	-	Inverness and Fort Augustus	- - - -	Boulton & Watt.
—	Lady of the Lake -	76	90	-	-	Leith and Stirling; 1816 crossed to the Elbe, and plied between Hamburg and Cuxhaven	- - - -	—
—	Morning Star -	100	26	-	-	Leith and Allon.	Gray, Kincardine -	Mr. Bell.
—	Phoenix -	90	3	High Pressure	-	Norwich and Yarmouth	- - - -	Cook, Glasgow.
—	Eagle (double vessel)	25	4	High Pressure	-	- Ditto - (this Engine exploded in 1816)	Wright, Yarmouth -	—
—	Richmond -	40	6	-	-	Went up the Seine in 1815 -	Wright, Yarmouth -	Watts, Yarmouth.
—	Perseverance -	60	10	-	-	London and Richmond	Lepingwell, Yarmouth -	Wright.
—	—	60	14	-	-	Newcastle and Shields	Boul, South Shore -	Maudslay & Co.
—	—	—	—	—	—	—	—	Crother, Newcastle.
1815.	Caledonia -	102	32	2	16	First on the Clyde; and in 1816 came round the Land's End to London; 1817, was re-fitted by Boulton and Watt; went up the Rhine, and in 1818 to Copenhagen.	Wood & Co. -	Greenhead & Co.
—	Argyle -	88	28	2	14	Glasgow and Inverary -	- - - -	Boulton & Watt.
—	Onca -	70	12	2	16	Glasgow and Greenock	Wood & Co. -	Greenhead & Co.
—	Swift -	12	3	-	-	Newcastle and Shields.	- Ditto -	Robertson.
—	Hope -	45	6	2	3	Chatham and Sheerness	Bristol -	Johnston.

1816.	Regent	112	24	2	12	London and Margate; destroyed by fire in 1817 and intended for the Congo expedition	Courthouse, Rotherhithe	Maudslay & Co.
—	Majestic	90	24	—	—	London and Margate; now London and South-	—	—
—	Congo	100	20	—	—	Selly and Hull	Court, Ramsgate	Dixon, London.
—	Caledonia	80	12	—	—	Glasgow and Inverary	King's Yard, Deptford	Boulton & Watt.
—	Neptune	88	40	2	90	Newhaven and Kinghorn	Smart's Dundee	Robertson.
—	Sir Wm. Wallace	95	32	2	16	Largs and Glasgow	Wood & Co.	Cook.
—	Albion	92	32	—	—	Across the Mersey at Liverpool	Ditto	Ditto.
—	Æna (double vessel)	75	20	—	—	Newcastle and Shields	Ditto	M'Arthur.
—	Eagle	70	20	—	—	—	Doeg, Newcastle	Fawcett & Littledale.
—	Tug	—	—	—	—	Leith and Stirling, and towing	—	Boulton & Watt.
1817.	Defiance	95	32	2	16	Glasgow and Loch Gilphead	Wood & Co.	M'Arthur.
—	Marion	50	14	—	—	Loch Lomond	Ditto	Robertson.
—	John Ball	70	14	—	—	Gainsborough and Hull	Moody, of Thorn	Napier.
—	Humber	75	15	—	—	Ditto	Brown, Perth	Buttery Company.
—	Britannia	80	12	—	—	London and Southend	Titterton, of Stockwith	Robertson.
—	London	70	15	—	—	London and Richmond	Searle, Westminster Bridge	Buttery Company.
—	Sons of Commerce	70	14	—	—	London and Gravesend	Laforet, Blackfriars	— Ditto.
—	Enterprise	80	20	—	—	Newcastle and Shields	Cockburn, St. Peter's Quay	— Ditto.
—	Rob Roy	30	5	—	—	—	—	Robson.
1818.	Lady of the Shannon	100	30	—	—	Glasgow and Belfast; now Dover and Calais	Denny, Dumbarton	Napier.
—	Marquis of Bute	90	20	—	—	—	Scot & Sons, Greenock	Cook.
—	Engineer	60	14	—	—	Glasgow and Gourock	Wood & Co.	Robertson.
—	Rising Star	315	70	2	35	London and Margate	D. Brest, Rotherhithe	Maudslay & Co.
—	Favourite	400	70	2	35	Gone to South America	Ditto	— Ditto.
—	Victory	160	40	2	20	London and Margate	Laforet, Blackfriars	Boulton & Watt.
—	British Queen	160	40	2	20	Ditto	Evans, Rotherhithe	Dixon.
—	Albion	75	20	—	—	Gainsborough and Hull	Smith, Gainsborough	Brunton, Birmingham.
—	Cobourg	75	24	—	—	Ditto	—	Harley Company.
—	Selly	75	24	—	—	Southampton and Cowes	—	— Ditto.
—	Speedwell	80	24	—	—	Hull and Barton	Foster, Selly	Overton & Smith.
—	Robert Bruce	40	10	—	—	Newcastle and Shields	Dixon, South Shore	Robson.
1819.	Talbot	155	60	2	30	Liverpool, Isle of Man, and Greenock; burnt in 1821	Scot & Sons, Greenock	Napier.
—	Waterloo	156	60	2	30	Holyhead and Dublin; now London and Calais	Wood & Co. Port Glasgow	Ditto.
—	Robert Burns	210	60	2	30	Liverpool and Dublin	Scot & Sons	Cook.
—	Port Glasgow	73	24	—	—	Glasgow and Helensburgh	Wood & Co.	Napier.
—	—	70	16	—	—	Ditto	Ditto	Murdoch.

(continue)

When Built.	NAMES OF VESSELS.	Tonnage.	Nominal Power.			WHERE EMPLOYED.	Where, or by whom Built.	NAMES OF ENGINEERS.
			Total Horse Power.	or,	Horse Power.			
1819.	Mersey	80	24	-	-	Across the Mersey at Liverpool	-	Fawcett & Littledale.
-	Eclipse	60	30	-	-	Liverpool and Runcorn	-	Branton, Birmingham.
-	Maria Tug	190	60	2	30	London and Margate	-	Boulton & Watt.
-	Favourite	80	24	-	-	Hull and Gainsborough	-	Horsley Company.
-	Countess of Scarborough	117	26	-	-	Hull and Selby	-	Ditto.
-	Hope	50	10	-	-	Gainsborough and York	-	Overton & Smith.
-	Swift	30	6	-	-	Newcastle and Shields	-	Robson.
-	Superb	9	3	-	-	Ditto	-	Ditto.
1820.	Ivanhoe	246	70	2	35	Liverpool, Isle of Man, and Greenock	-	Napier.
-	Inverary Castle	158	55	2	28	Holyhead and Dublin	-	Ditto.
-	Belfast	114	40	2	20	Glasgow and Inverary	-	Ditto.
-	Britannia	190	70	2	35	Liverpool and Dublin	-	Wood & Co.
-	Rothsary Castle	100	40	2	20	Glasgow and Campbelltown	-	Ritchie & Co. Belfast.
-	Glasgow	90	24	-	-	Glasgow and Isle of Bute	-	Wood & Co.
-	Earl of Egremont	90	24	2	12	Glasgow and Coast of Ayr.	-	Cook.
-	Diana	60	20	2	10	Towing for Chichester and Arundel Canal Company	-	M'Arthur.
-	Aire and Calder	110	35	-	-	London and Richmond	-	Canal Company, Milton, near Portsmouth
-	Leeds	195	30	-	-	Hull and Selby	-	Evans, Rotherhithe
-	Caledonia	80	30	2	15	Dundee and Perth	-	At Selby; Patent Cross Plank-
-	Tyne	40	10	-	-	Dundee and Shields	-	ing
-	Two Brothers	35	9	-	-	Ditto	-	Gutteridge, Selby
-	Indefatigable	30	8	-	-	Ditto	-	Smur, Dundee
-	Duchess of Northumberland	40	10	-	-	Ditto	-	Bolt, Newcastle
1821.	Majestic	360	100	2	50	Liverpool, Isle of Man, and Greenock	-	Davidson, South Shields
-	Mountain	190	70	2	35	London and Leith, now Liverpool and Dublin	-	Hutson, Howden Pass
-	Eclipse	140	60	2	30	Glasgow and Belfast	-	Wright - ditto
-	Rapid	140	66	2	28	Ditto	-	Scott & Sons, Greenock
-	Post Boy	80	20	2	10	Glasgow, Dunbarston and Greenock	-	Cornwallia, Greenock
-							-	Steel, Greenock
-							-	Cornwallia
-							-	M'Arthur.
-							-	Napier.

1891.	Highlander	67	24	Horizontal engine.	Glasgow, Fort William and Western Islands	Wood & Co.	M'Arthur.
	Comet	70	30		Ditto.	Government vessel altered under Mr. Brodrip's direction.	
	Tartar	180	60		Holyhead and Dublin	Wood & Co.	Cook. Napier.
	Caledonia	84	30	2	Glasgow and Helensburgh		
	Brilliant	160	40	2	Leith and Aberdeen.		
	Velocity	150	40	2	Ditto.		
	Sampson	100	40	2	Towing for Glasgow and Liverpool Shipping Company		
	Edinburgh Castle	148	40	2	Newhaven and Kinghorn	Wood & Co.	M'Arthur.
	Thane of Fife	148	40	2	Ditto	Ditto	Cook.
	Siar	90			Ditto.		
	Queen Margaret	100			Ditto.		
	Surprise	120			Stirling, Grangemouth and Leith.		
	Tourist	200	80	2	London and Leith	Brown, Perth	Gutzmer, Leith Walk.
	Union, (double Ferry Boat)	100	30	2	Dundee Ferry across to Fife	Ditto	Carmichael, Dundee.
	Swift	220	80	2	Brighton and Dieppe	Leith Smack lengthened	Gutzmer.
	Royal Sovereign, George the Fourth	205	80	2	Holyhead and Dublin Post Office Packet	Evans, Rotherhithe	Boulton & Watt.
	Meteor	190	60	2	Ditto	Ditto	Ditto.
	Dasher	130	40	2	Dover and Calais Post Office Packet	Ditto	Ditto.
	Arrow	130	40	2	Ditto	Patterson, Rotherhithe	Ditto.
	City of Edinburgh	400	80	2	Leith and London	Wigram, Blackwall	Ditto.
	Jamaica Watt	448	100	2	Ditto	Wood & Co. Port Glasgow	Ditto.
	Venus	265	60	2	London and Margate	Evans	Ditto.
	Eagle	170	40	2	London and Ramsgate	Brookbank, Deptford	Ditto.
	Swiftsure	104	30	2	London and Gravesend	Wigram, Blackwall	Ditto.
	Hero	233	90	2	London and Margate	Bancham, Frintbury on the Medway	Ditto.
	Cambria	130	50	2	Liverpool and Baglit	Mottershead & Hayes	Murray & Fenton, Leeds.
	Britannia	80	20		Across the Mersey	Ditto	Fawcett & Littledale.
	Abbey				Ditto	C. Grayson	Dove & Co. Liverpool.
	Portuguese	80	20	2	Ditto	Humble & Harvey	Ditto.
	Lady Stanley	87	20		Ditto	Mottershead & Hayes	Fawcett & Littledale.
	Navigator	40	18		Newcastle and Shields	Huson, Howden Pans	Dove & Co.
	Safety	36	14		Ditto	Davidson, Newcastle	Hawthorn.
	Union	20	4		Ditto	Bennet, South Shields	Hawkes.
	City of Glasgow	300	100	2	Liverpool, Isle of Man, Portpatrick, and Glasgow		Gibson.
	Rapid	140	60	2	London and Rotterdam	Scott & Sons, Greenock	Napier.
	St. Patrick	298	110	2	Liverpool, Dublin, Tenby and Bristol	Conwallis, Greenock	Ditto.
						Mottershead & Hayes	Fawcett & Littledale.

* These four vessels were built under the direction of Mr. Lang, of the Navy Office.

(continued)

When Built.	NAMES OF VESSELS.	Tonnage.	Nominal Power.			WHERE EMPLOYED.		Where, or by whom Built.	NAMES OF ENGINEERS.
			Total Horse Power.	σ.	Horse Power.				
1892.	St. George	312	110	2	55	Liverpool, Isle of Man, Portpatrick, and Greenock	-	Dawson & Pearson	Fawcett & Littlehale.
-	Duke of Lancaster	141	50	2	25	Liverpool, Whitehaven, Isle of Man, and Dumfries	-	Motterhead & Hayes	- Ditto.
-	Hercules	130	60	2	30	Towing in the Clyde	-	-	M ^r Arthur.
-	Towart	120	50	2	25	Glasgow and Inverary	-	-	- Ditto.
-	Highland Chief	65	16	-	-	Stranraer.	-	-	-
-	Albion	160	60	2	30	Liverpool and Bangor, along the Coast	Walch	-	-
-	Prince Llewellyn	170	70	2	35	-	-	Motterhead & Hayes	Fawcett & Littlehale.
-	Bristol Cantara	100	30	-	-	-	-	Wilson & Co.	- Ditto.
-	Lord Melville	220	80	2	40	Bristol	-	J. James	Dove & Co.
-	Sir Joseph York	100	30	-	-	London and Calais	-	Jelliffe, Banks & Co.	Battery Company.
-	Royal Sovereign	220	80	2	40	London, Southend and Sheerness	-	-	- Ditto.
-	Sovereign	95	32	2	16	London and Ramsgate	-	Brocklebank, Deptford	- Ditto.
-	Union	95	32	2	16	Dover and Boulogne	-	James Duke, Dover	Maudslay, London.
-	Medusa	53	16	2	8	-	-	-	- Ditto.
-	Medina	90	20	2	10	-	-	Evaas	Yates.
-	Aaron Manby	100	36	-	-	-	-	Ditto	Horsly Company.
-	-	140	28	-	-	Southampton to Cowes	-	-	- Ditto.
-	-	-	-	-	-	On the Seine	-	-	-
-	-	-	-	-	-	-	-	Iron Vessel : built by Mr. Manby, Horsly Works, Tip- ton in Staffordshire	-
-	Yorkshireman	200	80	2	40	London and Hull	-	Pearson, Thorn	- Ditto.
-	King of the Netherlands	140	40	2	20	London and Rotterdam	-	Wigram	Murray and Fenton, Leeds.
-	Lemington Packet	30	7	-	-	Tyne	-	Bolt	Boatton & Watt. Hawthorn.

Appendix, No. 2.

RETURN of the Number and Average Length of the Voyages made by His Majesty's Packet Boats between Holyhead and Howth, for the year ending the 1st June 1822.

ROYAL SOVEREIGN:

143 - - - Voyages.

Average Length,

TO HOWTH:	TO HOLYHEAD:
7h. 39'	7h. 2 $\frac{1}{2}$ '

The longest Passages:

TO HOWTH:	H. M.	TO HOLYHEAD:	H. M.
1821:		1822:	
8 October -	- 11 45	10 April -	- 12 50
17 November -	- 11 25		
21 November -	- 11 5		
27 November -	- 13 40		
2 December -	- 13 20		
1822:			
2 January -	- 11 12		
8 March -	- 16 4		
25 March -	- 12 21		
26 April -	- 12 0		

Ten Shortest Passages:

TO HOWTH:	H. M.	TO HOLYHEAD:	H. M.
1821:		1821:	
23 June -	- 6 4	16 June -	- 6 0
7 July -	- 6 0	6 July -	- 6 5
10 November -	- 6 5	24 July -	- 6 3
1822:			
14 February -	- 5 53		
28 April -	- 5 48		
4 May -	- 5 50		
12 May -	- 6 5		

TALBOT:

16 - - - Voyages.

Average Length,

TO HOWTH:	TO HOLYHEAD:
9h. 24'	8h. 2 $\frac{1}{4}$ '

TARTAR:

20 - - - Voyages.

Average Length,

TO HOWTH:	TO HOLYHEAD:
15h. 27 $\frac{1}{2}$ '	9h. 48 $\frac{1}{2}$ '

METEOR:

147 - - - Voyages.

Average Length,

TO HOWTH:	TO HOLYHEAD:
8h. 16 $\frac{1}{2}$ '	7h. 17 $\frac{1}{4}$ '

Ten longest Passages.

TO HOWTH:	H. M.	TO HOLYHEAD:	H. M.
1821:		1821:	
20 October -	- 15 20	10 October -	- 15 45
22 November -	- 17 20	1822:	
19 December -	- 16 0	11 April -	- 23 10
1822:		10 May -	- 14 25
25 January -	- 15 50		
24 February -	- 15 45		
6 March -	- 15 30		
24 March -	- 16 58		

Ten shortest Passages:

TO HOWTH:	H. M.	TO HOLYHEAD:	H. M.
1821:		1821:	
1 August -	- 6 15	9 June -	- 6 6
9 October -	- 6 15	23 July -	- 6 16
		8 August -	- 6 10
		29 August -	- 6 10
		15 December -	- 5 45
		20 December -	- 5 53
		1822:	
		1 February -	- 5 30
		16 February -	- 6 0

IVANHOE:

6 - - - Voyages.

Average Length,

TO HOWTH:	TO HOLYHEAD:
11h. 57 $\frac{1}{2}$ '	6h. 53'

SAIL PACKETS:

46 - - - Voyages.

Average Length,

TO HOWTH:	TO HOLYHEAD:
15h. 2'	14h. 13'

TALBOT:

16 - - - Voyages.

Average Length,

TO HOWTH: 9h. 24' TO HOLYHEAD: 8h. 2 $\frac{1}{4}$ '

IVANHOE:

6 - - - Voyages.

Average Length,

TO HOWTH: 11h. 57 $\frac{1}{2}$ ' TO HOLYHEAD: 6h. 53'

TARTAR:

20 - - - Voyages.

Average Length,

TO HOWTH: 15h. 27 $\frac{1}{2}$ ' TO HOLYHEAD: 9h. 48 $\frac{1}{2}$ '

SAIL PACKETS:

46 - - - Voyages.

Average Length,

TO HOWTH: 15h. 2' TO HOLYHEAD: 14h. 13'

Holyhead,
8 June 1822. }

Norris M. Goddard,
Agent.

Note. THE Agent at Holyhead, in his Return, has stated the voyage out and home as one voyage only. The Mail from Holyhead to Dublin should be dispatched 365 days in each year. In the year ended 1st June 1822, the Packets were unable to proceed 18 days, owing to the state of the weather, consequently 347 Mails were dispatched on the regular days.

The Return makes 378 voyages, the excess is owing to separate Packets having been dispatched under special orders.

Appendix, No. 3.

(3).—STATEMENT of the Number of Passengers, Carriages and Horses, carried in His Majesty's Packet Boats between Holyhead and Howth, from the 1st January 1819 to the 31st December 1821, both included; together with Lists of the accustomed Charges on the same.

For the YEAR	TO HOWTH:						TO HOLYHEAD:					
	Whole Passengers.	Half Passengers.	Deck Passengers.	Four-wheeled Carriages.	Two-wheeled Carriages.	Horses.	Whole Passengers.	Half Passengers.	Deck Passengers.	Four-wheeled Carriages.	Two-wheeled Carriages.	Horses.
1819	5,578	513	1,007	273	49	217	5,021	515	268	232	39	206
1820	2,862	402	845	133	21	117	2,734	328	277	92	23	141
1821	4,992	835	2,016	259	42	124	4,646	811	437	248	36	188

LIST OF CHARGES
in His Majesty's Sail Packet Boats.

	£.	s.	d.
For each Cabin Passenger	1	1	—
Man Servant, and Child under seven years of age	—	10	6
Coach, Barouche, &c.	3	3	—
Chaise, Chariot or other four-wheeled Carriage	2	2	—
Gig, Curricie, or other two-wheeled Carriage	1	1	—
Horse	1	1	—

Holyhead, }
25th February, 1822. } *Norris M. Goddard,*
Agent.

LIST OF CHARGES
in His Majesty's Steam Packet Boats.

	£.	s.	d.
Passengers	1	5	—
Men Servants	—	12	6
Female Servants	1	5	—
Children under ten years of age	—	12	6
A Coach, Barouche, or Landau	3	5	—
Shipping ditto	—	10	6
A Chaise	2	10	—
Shipping ditto	—	10	6
A two-wheeled Carriage	1	10	—
Shipping ditto	—	5	—
A Horse	1	10	—
Shipping ditto	—	5	—

The whole of the above Rates to be paid in British Money.

No fee or extra demand of any sort to be made; and any person demanding more than the above Rates, will incur the high displeasure of my Lords the Postmaster General.

Holyhead, }
June 1821. } *R. H. Judd,*
Agent.

Appendix, No. 4.

A RETURN of the gross annual Produce of the Postage on Letters between Holyhead and Howth.

THE Postage between Holyhead and Howth is two pence for each single letter; and amounted in the year ended 5th January last, to £.9,147. 1s. 4d.

By the Acts of 24 Geo. 3, c. 8, and 55 Geo. 3, c. 145, the sum of £.9,000 per annum is paid to Ireland, out of the revenue of the British Post Office, "in lieu as well of the profits of the said Packets, as in compensation for other purposes."

General Post Office, }
13th April 1822. }

F. Freeling,
Secretary.

Appendix, No. 5.

A RETURN on Estimate of the gross annual Produce of the Fares charged on board the Holyhead Packets for Passengers, Carriages, Horses, Parcels and all other things.

THE gross annual Produce of the Fares charged on board the Holyhead Packets, for passengers, &c. has been roughly estimated at £.15,000; but this year they will amount to more, on account of the extra number of passengers attracted by His Majesty's visit to Ireland.

N. B.—The actual expenditure up to the present period, exclusive of the cost of the Sovereign and Meteor, has exceeded £.13,500.

General Post Office, }
13th April 1822. }

F. Freeling,
Secretary.

Appendix, No. 6.

A RETURN, showing in what manner the Luggage of Persons arriving at Holyhead by the Post Office Packets, is conveyed to the Custom House and examined, and of what Charges are made for Portage.

ON the arrival of the packet from Dublin, the tide-surveyor and his boatmen board her; but as the boat can seldom or never bring the luggage to the Custom House, in consequence of want of water and the distance of the office, the boatmen have provided a cart for the purpose of bringing the luggage from the head of the pier to the custom house for examination by the proper officers, which duty having been performed, the boatmen deliver the luggage to the owners at the different hotels, and charge the persons for each large portmanteau or trunk, one shilling; and for smaller packages, sixpence, or three pence, per package for portage. In consequence of a complaint to the Board, in January last, respecting these charges, the practice was discontinued; but, on the 5th March following, the boatmen petitioned the Board of Customs for a renewal of the former practice, and their petition was strongly recommended by the commanders of His Majesty's packets on the ground of public accommodation; and it appearing by a letter from Sir Henry Parnell, Bart. to the Secretary of the Customs, that the subject was coming immediately under the consideration of a Select Committee of the House of Commons, the Board deemed it fit to transmit the following directions to the Collector and Comptroller at the port at Beaumaris.

Custom House, London, 4th April 1822.

Gentlemen,

Having read your Report of the 5th ultimo, No. 100, on the application of the boatmen at Holyhead, praying that they may be allowed to convey the luggage of passengers landing from Ireland, in the same way as they were in the practice of doing prior to our order of the 16th February last, No. 39; and having adverted to the undermentioned suggestion, in a note from Sir Henry Parnell, Bart. to our Secretary, "That it will be as well to leave the business of carrying the luggage of passengers as it is, until the Committee of

of the House of Commons, which is now sitting, shall have an opportunity of investigating it;" We permit the boatmen to carry the baggage to the different inns for the present, but we direct that the remuneration for this service be paid to the boatmen through the hands of the principal officers at Holthead.

(signed)

R. B. Dean,
W. T. Roe,
G. Wilson,
J. Stewart. } Commissioners of
His Majesty's Customs.

Custom House, London, }
9th April 1822. } *G. Delaunay*, Secretary.

Appendix, No. 7.

QUERIES circulated by the Committee.

SIR,

London, March 21, 1822.

I AM directed by the Select Committee of the House of Commons, appointed to inquire into the Communication between London and Dublin, to send you the following QUERIES; and to request you will favour the Committee with such answers as you may think proper to give to them.

Your obedient Servant,

HENRY PARNELL, Chairman.

To

- 1.—WITH what steam vessels are you acquainted; whether used in rivers or in the open sea?
- 2.—By whom were they built, and by whom were the engines made?
- 3.—What is their respective tonnage, and what the respective power of their engines?
- 4.—Have any of these vessels performed winter voyages at sea?
- 5.—Supposing the length of voyage to be 20 leagues from port to port, across a sea exposed to strong tides and heavy gales, how many vessels, in your opinion, would be necessary to be maintained, so that two should sail every morning, that is, one from each port throughout the whole year;—except on days when a strong cutter of 100 tons burthen would be obliged to put three reefs in her mainsail?
- 6.—What description of vessels, as to tonnage, form, strength of building, masts and sails, in your opinion, is the best for sea navigation?
- 7.—What description of engine, as to power, materials, and general form and arrangement, and what description of boilers and paddles, in your opinion, are the best?
- 8.—In what parts do engines most frequently get out of order, or break?
- 9.—Can you suggest any improvements in the present plan of building steam vessels, and constructing their engines, boilers and paddles?
- 10.—Can you suggest any plan for enabling a steam vessel to use sails, so as to be able to beat to windward, in case her engine should be out of order, at the same time offering but little impediment to her steaming power?
- 11.—In a gale of wind, with a heavy sea, what is the best mode of managing a steam vessel?

Appendix, No. 8.

ANSWERS to the Circular of Queries, relating to Steam Boats.

(1.)—EXTRACTS from the Answers of Captain *Charles H. Townley*, Commanding the Mountaineer Steam Packet.

Query 1.—WITH what steam vessels are you acquainted; and whether used in rivers or open seas?

Answer.—I am acquainted with most steam vessels, and have commanded all those plying between Dublin and Liverpool since the year 1819; first, the "Waterloo;" secondly, the "Belfast;" and at present the "Mountaineer."

4.—Have any of them performed winter voyages at sea?

With the exception of the "Belfast," which sailed between Belfast and Glasgow, none of them have continued plying through the winter months, but all have experienced as severe gales as blew during the winter. We generally begin to ply in February and leave off in November.

5.—Supposing the voyage twenty leagues, &c. how many vessels would be necessary that one should sail every morning from each port, &c. &c. &c.?

Three vessels I conceive would be sufficient.

6.—What description of vessel is best for sea navigation?

Sir Robert Seppings's plan as to strength, either lugger or schooner rigged, tonnage about two hundred or two hundred and thirty; as to form, a steam vessel should have an extreme fine entrance below, rise well forward, and flam off, so as to let her fall easy into the sea, and throw it off when steaming head to wind; she should have but little rise of floor so as to be pretty flat under the engines, and run off as clean as possible abaft; I approve of giving them a great deal of rake forward. A vessel of this form, with two forty horse engines, should be equal to any weather. The Mountaineer which I command at present, is, in my opinion, the finest model of any steam vessel yet built.

7.—What description of engines, boilers and paddles is best?

There can be no description of engines or boilers superior to those of Messrs. Boulton and Watt, and Napier, Glasgow. For paddles, see Query 9.

9.—Can you suggest any improvement in the vessels, engines, boilers or paddles?

Answered as to vessels, engines and boilers. As to paddles, they may be much improved; the common wheels are only adapted to smooth water, and cannot act to advantage if immersed more than two feet in the water; whereas, in a heavy sea, they are alternately out of the water or immersed six, eight or ten feet; in this case, the engines have either nothing to do, and consequently run dangerously fast, or are overloaded, the wheels being suddenly plunged axle deep in the water; also, in a heavy sea, going head to wind, the old wheels when deep in the water prevent the engines from acting to advantage, and making the requisite number of strokes, &c. &c. At my instance, the proprietor of the "Waterloo" was induced to adopt the new paddles invented by Mr. Oldham of Dublin, and the result has established their superiority over common wheels in heavy seas, particularly when the vessel is under canvas.

10.—Can you suggest any plan for enabling a steam vessel to use sails, &c. in case the engine be out of order, without impediment to her steaming?

I recommend lugger sails, with masts to lower down.

11.—In a gale of wind with a heavy sea, which is the best mode of navigating a steam vessel?

If the vessel is able by the use of steam to make head way, then I recommend steaming head to wind all sails down; but if not, the sails must be used, steering the vessel as near the wind as possible.

Chas H. Townley,
Commanding the Mountaineer
Steam packet.

(2.)—EXTRACTS from the Answers of Captain *Skinner*, dated Holyhead, April 22d, 1822.

Query 4.—HAVE any of these vessels performed winter voyages at sea?

Answer.—The Royal Sovereign, George the Fourth, and Meteor packets have performed nearly the whole of the public service between Holyhead and Howth since the 31st of May last, up to the present time; the Tartar has been occasionally employed on the same service since her arrival in December.

- 5.—Supposing the length of voyage to be twenty leagues from port to port, across a sea exposed to strong tides and heavy gales, how many vessels, in your opinion, would be necessary to be maintained, so that two should sail every morning, that is, one from each port throughout the whole year;—except on days when a strong cutter of one hundred tons burthen would be obliged to put three reefs in her mainsail.

Having in my previous answer stated that two steam vessels have performed nearly the whole of the public service between Holyhead and Howth since May last, which requires the daily departure of one vessel from each port, and there being about the same distance of sea between those places that is mentioned in this query; I am of opinion that to render an establishment for the performance of such a duty efficient, three would be absolutely required; but to ensure a vessel being always in readiness in case of accident to either of those on duty, whilst the third was under repair, four would be a preferable and more certain number.

- 6.—What description of vessel, as to tonnage, form, strength of building, masts and sails, in your opinion is the best for sea navigation?

A cutter of about one hundred and ten tons burthen, for confined seas, but a much larger ship for a more extended navigation; presmning, however, the query to apply to steam vessels only, I am of opinion one of about one hundred and eighty tons burthen; form, similar to that of His Majesty's packet Meteor, on this station, with a little finer entrance; and strength of building, with masts and sails the same, would be the best; a vessel of that description would be able to make a voyage when it was fit weather for any other vessel to put to sea.

- 8.—In what parts do engines most frequently get out of order, or break?

The cross heads of the engines of His Majesty's packets Royal Sovereign, George the Fourth, and Meteor, broke three or four times when they were made of cast iron, but now wrought iron being substituted in its stead, I think there is very little danger of its happening again; the air pumps are also liable to get out of order.

- 10.—Can you suggest any plan of enabling a steam vessel to use sails, so as to be able to beat to windward, in case her engine should be out of order, at the same time offering but little impediment to her steaming power?

I cannot suggest any plan of rigging a steam vessel so as to enable her to beat to windward under those circumstances; if larger masts and spars are fitted than those, for instance, that are on board the Royal Sovereign George the Fourth and Meteor packets on this station, to vessels of their tonnage, it would very materially counteract the effect of the engine when in a perfect state, steaming head to wind.

- 11.—In a gale of wind with a heavy sea, what is the best mode of managing a steam vessel?

On a wind, close reef the sails, and keep the engines going; from the wind, set whatever sails she will bear, and ease the engines considerably, as that is the time they are most liable to accident.

(3.)—EXTRACTS from the Answers of Captain Davies; dated Holyhead, April 24th, 1822.

Query 5.—SUPPOSING the length of voyage to be twenty leagues from port to port, across a sea exposed to strong tides and heavy gales, how many vessels, in your opinion, would be necessary to be maintained so as that two should sail every morning, one from each place, throughout the whole year, except on days when a strong cutter of one hundred tons burthen would be obliged to put three reefs in her mainsail?

Answer.—Three vessels might do it, but four would answer better, and in the end be less expensive.

- 6.—What description of vessel, as to tonnage, form, strength of building, masts and sails, in your opinion, is the best for sea navigation?

The two vessels on this station have answered wonderfully well; perhaps one of the size of the Meteor, but sharper, might answer better as steam vessels.

- 7.—What description of engine, as to power, materials, and general form and arrangement, and what description of boilers and paddles, in your opinion, are the best?

As far as I can judge, the engines of Messrs. Boulton and Watt, and to be made as strong as possible.

- 8.—In what parts do engines most frequently get out of order, or break?

As far as I have seen, the cross heads and piston rods; the shafts have given way, but that was owing to their not having been cast solid, which they now are.

- 10.—Can you suggest any plan for enabling a steam vessel to use sails, so as to be able to beat to windward in case her engine should be out of order, at the same time offering but little impediment to her steaming power?

I do not think it possible to combine steaming and sailing, so as to answer the purposes of both to perfection; or for a steam vessel to have sufficient sails to work off a lee shore, without impeding her steaming when required to steam head to wind.

11.—In

- 11.—In a gale of wind, with a heavy sea, what is the best mode of managing a steam vessel?

If caught on a lee shore, in a heavy gale, I would close reef the sails and slow the engine, keeping close on a wind, I should feel no doubt of getting off, if the engine held; if going before a heavy gale and sea, I would ease the engine, and scud under a square sail forward. I have been in both situations, and succeeded in making the voyage.

- (4.)—EXTRACTS from the Answers of Captain *J. Hamilton*, Commanding His Majesty's Steam Packet *Arrow*, on the Dover Station.

Query 6.—WHAT description of vessel, as to tonnage, form, strength of building, masts and sails, in your opinion, is the best for sea navigation?

Answer.—For all wet harbours, where there is at all times plenty of water, a vessel of about a hundred and eighty tons burthen, with a rising floor, about three inches hollow, to prevent her rolling; fair and easy curve water lines; the stem to rake well, which makes her easy, going head to sea; the stern post to stand square to the keel, and to draw from seven feet nine inches to eight feet water; to have two masts, with a fore-and-aft mainsail, a lug foresail, a jib, and a flying jib. I consider Sir R. Seppings's plan of trussing far superior to any other method of strengthening ships and vessels at present known. But in consequence of all the harbours in the neighbourhood of Dover being dry at low water, a very different form of bottom would be requisite. I should propose them to be of very easy draught of water; to have hollow bottoms, and bilgeways, which would possess great stability; to draw only five feet nine inches or six feet water, and to be vessels of ninety tons burthen.

7.—What description of engine, as to power, materials, and general form and arrangement, and what description of boilers and paddles, in your opinion, are the best?

I would recommend all engines using steam of low pressure, and condensing as on the principle of Boulton and Watt; for a vessel of a hundred and eighty tons burthen, two engines of thirty five horse power, and for a vessel of ninety tons burthen, two engines of twenty horse power; to have wrought iron beams, cross heads, shafts or axles of paddle wheels, copper boilers, copper steam pipe, and wrought iron paddle wheels, with boards for paddles, as they can easily be cut away in bad weather, and by all means to act on the first motion for a sea way, as they recover themselves much quicker than if with spur wheels. But as we have here one of our boats with copper boilers, and the other with iron, we shall soon find out by experience which is the best.

8.—In what parts do engines most frequently get out of order, or break?

The axles or paddle shafts, cross heads, beams, and likewise the steam pipes.

9.—Can you suggest any improvements on the present plan of building steam vessels, and constructing their engines, boilers and paddles?

Build them with hollow bottoms, and have bilgeways to prevent their rolling, this being the principal thing; for when one wheel gets too much under water, the other comes entirely out, and the engines lose their speed. I would recommend engines of low pressure, on the first motion, copper boilers, and leave room enough for a man to go all round them, and frequently to examine them. I would also recommend the boilers being in three pieces, as in case of being obliged to take them out, it might be done without removing any of the deck beams; have copper steam pipes, with wrought iron shafts, and paddle wheels, as they may be made smaller, and consequently much lighter than cast iron, and a great deal stronger; it is also a great advantage to get all the weight possible from the top and outside of all vessels, as it makes them easier at sea.

10.—Can you suggest any plan for enabling a steam vessel to use sails, so as to be able to beat to windward in case her engine should be out of order, at the same time offering but little impediment to her steaming power?

By cutting off the paddles, which should be composed of wood, in case of any accident occurring with the engine in bad weather; have a large lug foresail, which is a very powerful sail, a fore-and-aft mainsail, a jib, and occasionally a mizen to set, which would make the vessel stay, and steer better; by this means she would be enabled to work to windward, and the paddle wheels being small, would have but little effect in stopping the vessel's way through the water after the paddle boards were off.

11.—In a gale of wind, with a heavy sea, what is the best mode of managing a steam vessel?

If bound to any port, and meet with strong gale and heavy sea, keep her close hauled, so as to take the sea on the bow, (it being dangerous to take the sea on the broadside,) and when far enough to windward, keep away, so as to keep the sea on the quarter; and in case of having no port to go into, bring her up, giving plenty of cable, as steam vessels are generally very easy, and will ride well.

(5).—LETTER from *James Watt*, Esq. to the Chairman of the Holyhead Roads Committee, on the subject of Steam Packets.

Soho, near Birmingham, 19th April 1822.

SIR,

HAVING conferred with Mr. Murdock upon the *QUERIES* relative to steam vessels, addressed to each of us in your circular of the 21st ultimo, I shall now have the honour, in the absence of Mr. Murdock, of transmitting such answer as our joint information and experience enables us to give.

The engines manufactured by our firm of Boulton, Watt & Co. for steam vessels, are the only ones of which we have personal knowledge, and by much the greater part have been for river use.

The first was made for the late Mr. Fulton, of New York, in 1804, and used in his first passage boat on the Hudson River in 1806 or 7; and the first with two engines, having the cranks working at right angles to each other, was for a boat upon the river Clyde in 1813. We have made a considerable number for the river St. Lawrence, for rivers in Great Britain and on the continent; in all of which next to economy of fuel, lightness of the materials was considered a principle requisite, to enable the vessels to draw the least water, and to oppose the least resistance to the power.

In 1817, we fitted up the *Caledonia*, a Clyde built vessel, of fifteen and a half feet beam, and four and a half feet draught of water, with two steam engines of the joint power of twenty-eight horses, which gave it a velocity of eight and a half miles per hour in still water. With this I crossed the sea to Holland, near the end of October of that year, and ascended the Rhine to Coblenz. It was in the next year purchased by a company at Copenhagen, and has since that time been employed as a summer passage boat between that city and Kiel.

The same general construction of machinery, with the improvements which our experience had suggested, was adopted in the steam engines made by us for the vessels of His Majesty's Post Office, employed between Holyhead and Dublin, and between Dover and Calais, viz. the *Royal Sovereign* and the *Meteor*, the *Dasher* and the *Arrow*.

These vessels are, as far as is known to us, among the first that have made nearly regular sea passages throughout the winter season, and that winter, as well as the autumn which preceded it, peculiarly stormy. The practicability of keeping the communications open by their means, except in such weather when no vessel can live at sea, appears demonstrated; and although some accidents have taken place in the machinery, the novelty of the service must be allowed its weight, as well as the little time that could be allotted for repairs during the earlier part of the season in the vessels employed upon the Holyhead station.

With the experience now obtained, we make no doubt that we shall be able to construct machinery less liable to accident; but much must always depend upon the vigilance and experience of the men who work the engines, as well as upon the skill of the officers who manage the vessels. In these respects the engines we have made for His Majesty's packets have had full justice done to them.

The important object of economy of fuel, appears to have been attained in these engines, and will not, we believe, be affected by the improvement which has been suggested to us by the officers of His Majesty's Post Office, of keeping the boilers lower in the vessel, and by other means diminishing the top weight, so as to render them more steady at sea, which will both improve the action of the machinery and add to the safety of the vessel.

To these points we should wish to confine our remarks, as with regard to the best construction of vessels for sea passages, and the modes of managing them at sea, we should rather refer you to the opinions of the nautical gentlemen under whose management they have been placed.

The only other engines constructed by us for vessels intended for sea passages, have been those for the City of Edinburgh and the *James Watt*, each of them vessels of twenty-five and a half feet beam, the former having engines of eighty, and the latter of one hundred horse power, and both intended to convey passengers between London and Edinburgh; the former was used during part of the last season, and the latter will commence her passages in the present month, or early in the ensuing one.

I have the honour to remain, Sir, your obedient humble Servant,

James Watt

(6).—EXTRACTS from the Answers of *J. Johnston*, Engineer of the *Royal Sovereign*, Holyhead.

Answer 5.—THREE good steam vessels will do for this station, and go out when any cutter whatever could possibly put to sea.

6.—A vessel of one hundred and eighty tons, with lug sails, in my opinion, is the best for steam packets.

7.—With two forty horse engines put lower down in the bottom of the vessel; boilers and paddles as Mr. Watt introduces at present.

8.—There is no particular part that I know of where engines get out of order: they will break down at any place and very often without any apparent cause; only I would just remark again, that a thing seldom breaks by being too strong. The cause of the cross heads
breaking

breaking is by getting the condenser hotter than the cylinder; when the ejection water is given it rushes into the cylinder, where the most vacuum is in consequence of its being colder.

9.—The vessel ought to have a fine waterline, with a flaring bow square tuck, when the vessel is steaming head on with a heavy sea, she would not be immersed under water so much, and the wheels would have better action on the surface of the water, with great power to press the vessel through; and having the engines nearer together, and lower in the bottom of the vessel, she would not roll so much.

April 27th, 1822.

(7.)—EXTRACTS from the Answers of Captain *Stevens*, Captain in H. M. Packet Service, Holyhead, April 20th, 1822.

Query 5.—SUPPOSING the length of voyage to be twenty leagues from port to port, across a sea exposed to strong tides and heavy gales, how many vessels, in your opinion, would be necessary to be maintained, so that two should sail every morning, that is, one from each port throughout the year; except on days when a strong cutter of one hundred tons burthen would be obliged to put three reefs in her mainsail?

Answer.—Three strong and perfectly efficient vessels may perform the service between Holyhead and Howth, supposing no material accident to occur.

6.—What description of vessel, as to tonnage, form, strength of building, masts and sails, is the best for sea navigation?

Supposing the question confined to steam vessels, one of the Meteor's size, of the same construction from aft to as far forward as the fore chains, from thence forward to the stern considerably finer; strength of building, the same as Royal Sovereign, George the Fourth, and Meteor.

7.—What description of engine, as to power, materials, and general form and arrangement, and what description of boilers and paddles, in your opinion, is the best?

An engine of sixty horse power would be, under all circumstances, the best in this Channel, when fixed in a vessel of the tonnage mentioned in the preceding answer. Respecting the materials, form and general arrangement of the boilers, those made by Messrs. Boulton and Watt are decidedly the best I have seen. The paddle wheels now fixed to the Royal Sovereign and Meteor have stood the last winter remarkably well, but something of the plan of those fixed to the Tartar may in very bad weather be preferable.

8.—In what part do engines most frequently break and get out of order?

Cross heads, side rods, fore-and-aft beams, and air pumps.

10.—Can you suggest any plan for enabling a steam vessel to use sails, so as to be able to beat to windward in case her engine should be out of order, at the same time offering but little impediment to her steaming power.

If she were rigged sufficiently heavy to beat to windward, the top hamper would prevent her using steam to advantage, even when the engine was in perfect order. I cannot suggest any material improvement in the rigging of the Royal Sovereign and Meteor.

11.—In a gale of wind with a heavy sea, what is the best mode of managing a steam vessel?

If the gale was very heavy, I would bring her under low canvas, and slow the engine to prevent its jerking, so that she might lay-to easy, having from three to four knots way through the water, if upon a wind; but if before it, scud under a reefed square-sail, with the valves half or two-thirds closed.

(8.)—ANSWERS from Messrs. *Maudslay and Field*.

SIR,

Lambeth, 29th April 1822.

IN compliance with your desire, we have prepared answers to the Queries contained in your Letter of the 21st March, which we hope will prove satisfactory; we shall at all times feel most happy to furnish the Committee with any information in our power on this or any other subject.

To the Chairman of the
Holyhead Roads Committee,
House of Commons.

We have the honour to be, with great respect,
Your obedient Servant,
Henry Maudslay & Joshua Field.

Query 1.—With what steam vessels are you acquainted; whether used in rivers or the open sea?

2.—By whom were they built, and by whom were their engines made?

3.—What is their respective tonnage, and what the respective power of their engines?

Answer.—We have considered the best mode of answering the three first questions to be, by arranging the names of the vessels, the tonnage, the power, &c. in a tabular form. And having made the subject of steam vessels a matter of study as well as business, and had opportunities of seeing most of the vessels named in the annexed Table, and making voyages in many of them, we are persuaded it is tolerably correct.

4.—Have any of these vessels performed winter voyages at sea?

Before the last winter, no steam vessels in this country have been worked through the whole winter at sea. The Rob Roy has worked through the last winter between Dover and Calais

also the Post Office packets at Dover, and the Irish Packets at Holyhead; the Liverpool and Dublin, as well as the Liverpool and Clyde vessels, have worked very far into the winter, and we believe the Glasgow and Belfast packets have continued to go through the winter.

- 5.—Supposing the length of a voyage to be twenty leagues from port to port, across a sea exposed to strong tides and heavy gales of wind, how many vessels, in your opinion, would be necessary to be maintained, so that two should sail every morning, that is, one from each port throughout the whole year; except on days when a strong cutter of one hundred tons burthen would be obliged to put three reefs in her mainsail?

Four vessels employed, would allow a day between each voyage; and this would be very easy work in moderate weather, and allow ample time for cleaning the boilers, and keeping every thing in good order; but detention by stress of weather, and occasional accidents and repairs, would render it necessary to keep two more, that is, one at each port in reserve, to relieve either that might be out of order, or to take the turn of any one that might from any cause be out of time.

With six vessels, and such an arrangement, a daily communication might be maintained permanently, except in violent gales when it would be improper to put to sea.

- 6.—What description of vessel, as to tonnage, form, strength of building, masts and sails, is in your opinion the best for sea navigation?

The steam vessels hitherto used, have been built with a view to the accommodation of passengers; the space allotted to the machinery, and consequently the power of the engines, has been very limited; but a vessel, built with a view to sea navigation alone, should have the greatest power a given vessel can contain and carry, nearly the whole of the interior being appropriated to machinery and fuel; her form under water should be that of the fastest schooner; bold at the bows; the whole vessel rising but little out of the water; the centre of gravity kept as low as possible; the spongings, or projecting work on the sides, added to the proper body of the vessel, and rising from the waterline, at an angle nowhere exceeding forty degrees from the perpendicular of the side; the wheels as large as consistent with the foregoing conditions; the rigging to strike completely; the chimney formed to cut the wind; the bulwarks, wheel cases, and all the exterior of the vessel, smooth and free from projections that would hold the wind; both vessel and machinery exceedingly strong.

A steam vessel and engine to encounter a gale that would bring a stout frigate under her double reefed topsails, or a good cutter under a three reefed mainsail, should be a vessel of about two hundred tons, constructed as above stated, with two fifty horse engines every way proportioned in strength to the vessel; this would effect a passage even against such a gale.

- 7.—What description as to power, materials, and general form and arrangement, and what description of boilers and paddles in your opinion are the best?

Condensing, or low pressure engines, have been mostly used for vessels in this country; a fatal explosion having taken place, early in the introduction of steam vessels here, has checked the use of high pressure engines for the present; and we are of opinion they should not be employed in vessels carrying passengers, until successive improvements shall have rendered the explosion of the boiler impossible.

With regard to the quantity of power proper to put in a sea vessel, the only limit should be the weight of engine and fuel the vessel will carry and contain; no vessel ever had too much power, even in still water, much less when contending against a powerful head wind. Two engines of half the power each, are more manageable and possess many advantages over one of the whole power; they produce a perfectly uniform rotation in the wheels, and are not subject, like single engines, to be stopped on the centre in heavy seas, and in case of injury to one engine, the other is still available.

The best materials are those which possess the greatest strength with the least weight; hence wrought iron is preferable to cast iron in the active parts of the engines.

The best arrangement of the machinery, and in which engineers are most agreed, is to place the boiler or boilers a few feet abaft the centre of buoyancy of the vessel; the two engines on each side, a few feet forward of this point, and the coals on the centre of buoyancy; this arrangement brings the fuel, which is constantly variable, on a point that will not affect the trim of the vessel; it also brings the wheel shaft, which is at the foremost end of the engine, to its best position as regards the length of the vessel, at about one-third from the head; the weight of the boiler, engine and coal, is thus spread pretty equally over the space allotted for them, and partial or intense weight on any one part is thus avoided.

The boilers for sea water should unquestionably be of copper; as iron boilers, with the greatest care, will not last more than two years constantly working in salt water, without a thorough repair and great detention and loss of time to the vessel, while copper in the same time is not sensibly affected.

The paddle wheels should be very simply constructed, exceedingly strong, and easy of repair, for these reasons wood paddle boards, with iron wheels, are found advantageous in practice.

- 8.—In what parts do engines most frequently get out of order or break?

The boiler is generally the first part out of order, from wear or decay; first, from the corrosive effect of the hot salt water upon the iron, this evil does not exist where copper is substituted; secondly, from the water becoming so saturated with salt, in long voyages, or through neglecting to change the water and clean the boiler, that the fire places are frequently burnt and injured, from an incrustation of salt on the crown of the fire place preventing the

the contact of the water; third, from neglect in supplying the boiler with water; if the fire places are not kept covered with water, the tops are inevitably burnt. It is the most important part of the duty of an engine keeper to guard against these evils.

In an engine having all its parts well proportioned, and constructed with all the securities experience has suggested, properly taken care of, and attended to, it is difficult to say where it is most liable to break; except that the wheels and shafts being more exposed to external violence, are on that account perhaps more likely to be broken than the interior parts of the machinery; the straining of vessels at sea has frequently broken some parts of the machinery, but in a vessel well adapted for the open sea, her great strength should be a security against accident from this cause; every thing else we consider to be perfectly accidental.

9.—Can you suggest any improvements in the present plan of building steam vessels, and constructing their engines, boilers and paddles?

The present plan is far from having attained a standard, except in the general principle in which nothing has been lately done. Experience suggests in every new vessel and engine some improvements to make or objections to remove, therefore the latest may generally be considered the best vessels and engines; we respectfully submit, that much of this question is answered in the replies to question the sixth.

10.—Can you suggest any plan for enabling a steam vessel to use sails, so as to be able to beat to windward, in case her engine should be out of order, at the same time offering but little impediment to her steaming power?

Experience in the management of steam vessels at sea will, we have no doubt, lead to a better combination of the sailing and steaming powers than has hitherto been attained; the former having been deemed secondary, and but little considered.

It seems probable that this object will be best effected, not by any standing masts and rigging, but by some improved striking rigging and masts, with machinery for easily raising and lowering it. Hollow masts and yards, in wood or iron, from their lightness, seem to be very applicable to this purpose; the power of the engine might easily be applied to raise them in some cases, and in large vessels.

Sails in a brisk wind do not add much more than a knot per hour to the speed of a fast-going steam vessel, whereas the standing masts and rigging alone against the same wind, will abstract more than two, or sometimes three knots from the rate of motion, and that at a time when it can be ill spared; therefore standing rigging and masts may on the whole be considered a greater evil than benefit; this suggests the propriety of attempting to obtain a superior method of raising and lowering the masts and rigging of large steam vessels, as it would be certainly improper for them to go to sea without possessing the power of using sails.

With masts and rigging proportionate to the vessel, there does not appear any reason why a steam vessel should not beat to windward without the engine, but in this case the wheels must be constructed so as to detach them easily from the engine, and allow their turning freely on their own axis, when they will occasion no sensible impediment to the vessel's progress.

11.—In a gale of wind, with a heavy sea, what is the best mode of managing a steam vessel?

All that can be required on the part of the engine keeper in this case, is an increased vigilance in proportion to the apparent increase of danger; and all he can do is to keep his engines working to their full power. The management of the vessel is a question purely nautical, and every thing must depend on the situation of the vessel as regards the neighbouring coasts, the tides, the wind, and the course required to be steered.

All which is respectfully submitted,

Henry Maudslay.

Joshua Field.

(9.)—EXTRACTS from the Answers of *James Brown*, esq. Superintending Engineer of the Works at Holyhead Harbour, April 23d, 1822.

Query 4.—HAVE any of these vessels performed winter voyages at sea?

Answer.—The Royal Sovereign and Meteor (being built and fitted out as His Majesty's packet boats) have performed the service between this harbour and Howth through the winter, and have made their passages when it was considered that no sailing packets whatever could do so.

5.—Supposing the length of voyage to be twenty leagues from port to port, across a sea exposed to strong tides and heavy gales, how many vessels, in your opinion, would be necessary to be maintained, so that two should sail every morning, that is, one from each port throughout the whole year; except on days when a strong cutter of one hundred tons burthen would be obliged to put three reefs in her mainsail?

I am of opinion that four steam packets would perform the service, independent of any cutter vessels whatever.

6.—What description of vessel, as to tonnage, form, strength of building, masts and sails, in your opinion, is the best for sea navigation?

I am of opinion that His Majesty's steam packets, Royal Sovereign and Meteor, are of that description, as to tonnage, strength, masts and sails, that appear at present best calculated for this channel.

- 7.—What description of engine, as to power, materials and general form and arrangement, and what description of boilers and paddles in your opinion are the best?

I am of opinion that the description of engines now in the Royal Sovereign of about eighty horse power, and the same description of boilers are the best, as the engines made by Messrs. Watt and Boulton consume a much less quantity of coal, will last longer, and are less liable to get out of order than any other I have ever seen.

- 8.—In what parts do engines most frequently get out of order or break?

The parts of an engine most likely to get out of order, are the shaft and framing, but considerable improvements have been made lately in those things.

- 10.—Can you suggest any plan for enabling a steam vessel to use sails, so as to be able to beat to windward, in case her engine should be out of order, at the same time offering but little impediment to her steaming power?

I am of opinion that a steam vessel cannot be made able to beat to windward without rigging her in a manner that would cause great impediment to her steaming power.

- (10.)—EXTRACTS from the Answers of Captain *M. Goddard* of H.M. Packet Service, Holyhead, April 10th, 1822.

Query 9.—CAN you suggest any improvements in the present plan of building steam vessels, and constructing their engines, boilers and paddles?

Answer.—As to the general form of steam vessels, I am not aware that any improvement can be made beyond some trifling alteration in the lines of the hull of such as H.M. packet boats, Royal Sovereign and Meteor; which by their performances through the past winter have exceeded the most sanguine expectations; and certainly have made passages across the Channel at times when the former sailing packets would have found extreme difficulty to have accomplished them; and in so short a period of time as places their performance beyond the necessity of comparison to establish their great superiority.

- 10.—Can you suggest any plan for enabling a steam vessel to use sails, so as to be able to beat to windward in case her engine should be out of order, at the same time offering but little impediment to her steaming power?

Any increase of means to make progress by sails beyond that afforded by the limited height of the present masts in the Royal Sovereign and Meteor, which scarcely overtop the funnel, would in my opinion offer an increase of impediment to their steaming power; whilst to enable them to beat to windward under a moderate or a fresh breeze without the aid of the engine, as much greater height of mast (and probably a great spread of yard) would unquestionably be requisite.

- 11.—In a gale of wind with a heavy sea, what is the best mode of managing a steam vessel?

The point from which the supposed gale of wind is to blow, relatively with the steam vessel's course not being defined, I cannot reply to this question, as each gale of a different relative direction would require distinct management.

- (11.)—EXTRACTS from the Answers from Messrs. *Fenton and Murray*; dated Steam Engine Manufactory, Leeds, April 27th 1822.

Query 5.—SUPPOSING the length of voyage to be twenty leagues from port to port, across a sea exposed to strong tides and heavy gales, how many vessels, in your opinion, would be necessary to be maintained, so that two should sail every morning, that is, one from each port throughout the whole year; except on days when a strong cutter of one hundred tons burthen would be obliged to put three reefs in her mainsail?

Answer.—In our opinion it would require six vessels, that is, a spare one at each port, undergoing such repairs as the repairing or putting in a new boiler, or undergoing a general repair. The other four vessels to change alternately, and would have a day for cleaning and slight repairs. Fewer than these would not be safe to trust to.

- 6.—What description of vessel, as to tonnage, form, strength of building, masts and sails, in your opinion, is the best for sea navigation?

This question must refer to the particular purpose of the vessel, and will be best obtained by a reference to vessels built particularly for that sea it is intended for. We believe the deep and sharp formed bottom is best for a rough or boisterous sea, as the Channel, and the flat or rounded formed bottom for the North Sea; but ship-builders are not agreed on this point.

- 7.—What description of engine, as to power, materials, and general form and arrangement, and what description of boilers and paddles in your opinion are the best?

The double engine with two cylinders is the best at present known for a steam vessel; the power most easily managed, is from twenty to sixty horse power, according to the purpose and tonnage of the vessel. We cannot describe the general form and arrangements without plans, better than by saying that these engines have their beams working below, with side rods

rods and cross heads, all of which ought to be made of the toughest description of wrought iron. The boiler ought to be what we call a combined boiler, viz. three distinct boilers put together to form one boiler, with the fire passing three times through each, and so constructed as to be taken up and down a hatchway without pulling up or destroying the deck. The paddle wheels, shafts and arms of the toughest wrought iron, and we think wood paddle boards best for sea.

8.—In what parts do engines most frequently get out of order or break?

Cross heads, beams and paddle wheel shafts have generally broken from being made of cast iron, and ought to be made, as stated above, of the best wrought iron. In general, things that are difficult to repair should be made so strong as to ensure them against breaking, and nothing ought to be suffered to be near the breaking point but what can be easily repaired.

Your's, very respectfully,
Fenton and Murray.

(12.)—EXTRACTS from the Answers of *William Minchin*, Engineer of H. M. Post Office Packet Meteor, on the Holyhead Station.

Query 5.—SUPPOSING the length of voyage to be twenty leagues from port to port, across a sea exposed to strong tides and heavy gales; in your opinion, how many vessels would be necessary to be maintained, so that two should sail every morning, that is, one from each port throughout the whole year; except on days when a strong cutter of one hundred tons burthen would be obliged to put three reefs in her mainsail?

Answer.—In my opinion, there must be four vessels, as it is possible that two may be out of order at the same time; and I have no doubt, but four vessels would last longer than six, as those work at present, as those could never have been cold, had the engines not broke, up to this time.

6.—What description of vessel, as to tonnage, form, strength of building, masts and sails, in your opinion, is the best for sea navigation?

As to building, I think the Meteor an excellent model, with the addition of a little more keel and lug sails, and the foremast about seven feet further aft.

7.—What description of engines, as to power, materials and general form and arrangements, and what description of boilers and paddles, in your opinion are the best?

As to engines, I think the present form cannot be exceeded, and they are of the least expense for fuel of any that I have seen, owing to a well-constructed boiler; the paddle wheel I would recommend to be as large in the diameter as the vessel can admit of, and close to the vessel's side, as the wheel will be less exposed to the sea.

8.—In what parts do engines most frequently get out of order or break?

It is in those things which I recommend to be wrought iron; and in general, the air pump, which I would advise to be made of brass, and also the bucket of the same, as they work very smooth, and are very durable.

9.—Can you suggest any improvements in the present plan of building steam vessels, and constructing their engines, boilers and paddles?

I cannot suggest any thing, except increasing the diameter of the wheel.

Wm. Minchin.

(13.)—ANSWERS of *Mr. John Scott*, of Greenock, to the Queries made by the Select Committee of the House of Commons.

Query 1.—WITH what steam vessels are you acquainted, whether used in rivers or in the open sea?

Answer.—I am accustomed to see many steam vessels plying daily on the river and Frith of Clyde, but am more particularly acquainted with the *Lady of the Shannon*, *Robert Bruce*, *Waterloo*, *Ivanhoe*, *Superb*, *Majestic* and *City of Glasgow*, plying in rivers and in the open sea.

2.—By whom were they built, and by whom were the engines made?

These vessels I have mentioned were built by myself; the engines made for the *Lady of the Shannon* and *Waterloo*, by James Cook, engineer, Glasgow; and for the *Robert Bruce*, *Ivanhoe*, *Superb*, *Majestic*, and *City of Glasgow*, by David Napier, engineer, Glasgow.

3.—What is their respective tonnage, and what the respective power of their engines?

Lady of the Shannon, ninety tons; *Robert Bruce*, one hundred and fifty-five tons; *Waterloo*, two hundred and ten tons; *Ivanhoe*, one hundred and fifty-eight tons; *Superb*, two hundred and forty-six tons; *Majestic*, three hundred and fifty tons; *City of Glasgow*, three hundred tons;—first, one twenty horsepower engine; second, two thirties; third, two thirties; fourth, two thirties; fifth, two thirty-sixes; sixth, two fifties; seventh, two fifties.

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4.—Have

4.—Have any of these vessels performed winter voyages at sea?

The *Robert Bruce*, *Superb*, *Majestic* and *City* of Glasgow, are packets between this port and Liverpool, calling at Port Patrick and Douglas, Isle of Man, and ply from the end of March till the middle of November, often in very bad weather; passage from twenty-one to twenty-eight hours. The *Ivanhoe* was a Holyhead packet, plying during the same period; the average of passage about seven hours and a half.

5.—Supposing the length of voyage to be twenty leagues from port to port, across a sea exposed to strong tides and heavy gales, how many vessels, in your opinion, would be necessary to be maintained, so that two should sail every morning, that is, one from each port throughout the whole year; except on days when a strong cutter of one hundred tons would be obliged to put three reefs in her mainsail?

I am of opinion, that four well-constructed steam vessels would be necessary, similar to the *Superb* or *Ivanhoe*; and that vessels of the same description, would effect their passage, when a strong cutter of one hundred tons would be obliged to put three reefs in her mainsail.

6.—What description of vessel, as to tonnage, form, strength of building, masts and sails, in your opinion is the best for sea navigation?

A three masted schooner from one hundred and seventy-five to two hundred tons, with a double steam engine of fifty horse power each, of the form and construction of the above-mentioned steam vessels.

7.—What description of engine, as to power, materials and general form and arrangement, and what description of boilers and paddles, in your opinion are the best?

The steam engine on the most approved principle of Mr. Watt, of a power equal to the size, tonnage and description of the vessel intended, from twenty to fifty horse power, which is the largest and strongest we have yet used on the Clyde. Our boilers are chiefly in two equal parts of iron plates, with one furnace door to each. The *Superb's* boiler is of copper plates, and answers very well, and in my opinion will last much longer than iron, and when unserviceable, will sell for more than half its first cost. The *Majestic's* boiler is all in one, has two furnace doors, and weighs about twenty-one tons. This boiler produces plenty of steam to make the engine give from twenty-four to twenty-eight strokes per minute, when the firemen attend properly to their duty, by which the vessel is impelled generally about ten miles and upwards per hour; one objection to this boiler, is its very great weight, and trouble of removal out of the vessel when it wants repair or replacing. All the materials must be of the very best description, and as much malleable iron used as possible for main shafts, &c. The wheels or paddles the same as are used on the Clyde, which I have never yet known break or give way.

8.—In what parts do engines most frequently get out of order or break?

I cannot say what part of the engine most frequently gets out of order or breaks; I have heard of the main shaft breaking frequently, and the plumber bolts, forcing pump, rods, &c. when made of cast iron.

9.—Can you suggest any improvement in the present plan of building steam vessels, and constructing their engines, boilers and paddles?

I have continued to make the fore-body of my vessels very fine, with a good entry, which I have always found made the vessel sail faster and easier impelled. I have seen lately some boilers at Liverpool of Mr. Fawcett's, in three parts, with more furnace doors, which I conceive to be an improvement; they have not yet been in use, but very soon will, which will prove them. I have likewise seen Mr. Fawcett's engines, which appear to be of the very best materials, construction and workmanship, and more malleable iron used about them than any engines I have had an opportunity of examining.

10.—Can you suggest any plan for enabling a steam vessel to use sails, so as to be able to beat to windward in case her engine should be out of order, at the same time offering but little impediment to her steaming power?

The best plan that I have yet seen for the rig, is a three masted schooner, which is very snug in going against the wind; and in case of any accident happening to the engine, the three schooner's sails can be used, which will enable the vessel to beat to windward, by taking out three of the floats or paddles from each of the wheels, and turning round the wheels, so that the three spaces from which the floats were taken, will be on the lower side of the wheels; there will be no impediment to the vessel's sailing, and no back water caused by the wheels, when those boards are taken away, which may be done with great ease in about twenty minutes.

11.—In a gale of wind with a heavy sea, what is the best mode of managing a steam vessel?

In a strong gale of wind with a heavy sea, the best and safest mode of managing a steam vessel is, to keep her head to the sea, with just sufficient steam to make her go about half a knot per hour.

Greenock, 26th April 1822.

John Scott.

(14).—ANSWERS from Mr. W. Evans.

King and Queen Dock, Rotherhithe,

April 25th, 1822.

Honourable Sir,
I RECEIVED your favour of 21st March, and in reply to the several queries contained therein, I beg leave to submit the following answers.

Query 1.—With what steam vessels are you acquainted, whether used in rivers or in the open sea?

Answer.—I am acquainted with many steam vessels, both for rivers and the open sea.

2.—By whom were they built, and who made their engines?

Names of Vessels.	By whom built.	Who made their Engines.
Sons of Commerce - - -	Wm. Evans - - -	Boulton & Watt.
Victory - - -	Plans of Wm. Evans - - -	J. Dickson.
London - - -	Plans of Wm. Evans - - -	Buttlerly Company.
Favorite - - -	Wm. Evans - - -	Boulton & Watt.
Diana - - -	Wm. Evans - - -	Boulton & Watt.
Lightening - - -	Wm. Evans - - -	Boulton & Watt.
Meteor - - -	Wm. Evans - - -	Boulton & Watt.
Venus - - -	Wm. Evans - - -	Boulton & Watt.
Arrow - - -	Wm. Evans - - -	Boulton & Watt.
Dasher - - -	Wm. Evans - - -	Boulton & Watt.
Royal Sovereign - - -	Plans of Wm. Evans - - -	Buttlerly Company.
Union - - -	Wm. Evans - - -	{ Mr. Yates, on the plan and construction I would recommend.
Dart - - -	Wm. Evans - - -	
New Packet at Chester - - -	Plans of Wm. Evans - - -	Horsley Company.
		Buttlerly Company.

4.—Have any of these vessels performed winter voyages at sea?

The Lightning (now Royal Sovereign) and the Meteor have been in constant service, between Holyhead and Howth, since they were built, twelve months since, except when stopped by the breaking of their cast iron shafts, but as wrought iron is now adopted for shafts, cross heads, &c. I do not conceive there is any danger of such accidents in future. The Arrow and Dasher have likewise been running between Dover and Calais the last winter, without any delay of consequence. I am not acquainted with any other steam vessel that makes winter voyages at sea.

5.—Supposing the length of voyage to be twenty leagues from port to port, across a sea exposed to strong tides and heavy gales, how many vessels, in your opinion, are necessary to be maintained, so that two should sail every morning, that is, one from each port throughout the year; except when a strong cutter of a hundred tons burthen would be obliged to put three reefs in her mainsail?

I am of opinion that three steam vessels, of the best construction, are necessary to admit of two sailing every morning, that is, one from each port.

6.—What description of vessel, as to tonnage, form, strength of building, masts and sails, &c. in your opinion, are best for sea navigation?

I am of opinion that sea-going steam vessels will admit of great improvement in speed, and at the same time be much better adapted for sailing in the event of deranging their engines, than the present steam vessels. Impressed with these ideas, I some months since submitted my plans of new arrangement of machinery, &c. to the General Post Office, but my plans were not adopted; I should be ready to carry into effect those plans, should your honourable Committee sanction my proposals, and I will engage to propel a steam vessel one mile and a half and from that to two miles per hour, faster than the present steam packets, and with the same power and tonnage respectively. A vessel on the construction I propose would have the most decided superiority in going head to wind, a position of all others the most important. I am well aware that steam vessels have already done more than was anticipated a few years since, much however remains to be done, although repeated experiments for improvements in steam navigation have failed from the miscalculations or inexperience of the persons employed. I am not discouraged, but will, if required, submit my plans for the sanction of your honourable Committee. In answer to the latter part of this query, respecting the best manner of fitting the masts and sails, I do not feel myself competent to decide, as I am not well acquainted with seamanship.

7.—What description of engine, as to power, materials and general form and arrangement, and what description of boilers and paddles, in your opinion, are best?

As my improvements, in steam vessels, comprehend a different arrangement of machinery to any now in use, I have only to observe, that I prefer wrought iron shafts, cross heads and beams, in place of cast iron. I should recommend copper boilers in preference to iron, particularly for sea-going steam vessels.

8.—In what parts do engines get out of order and break?

Shafts, cross heads and beams generally break, they have often been made of cast iron; I consider if they were made of wrought iron, there is not much fear of such accidents in future.

9.—Can you suggest any improvements in the present plan of building steam vessels, and constructing their engines, boilers and paddles?

I can suggest such improvements in building steam vessels, and fixing their machinery, as will enable me to accomplish the object stated in answer to queries sixth and seventh.

10.—Can you suggest any plan so as to enable steam vessels to use sails, so as to be able to beat to windward in case her engine should be out of order, at the same time offering but little impediment to the steaming power?

A steam packet on my construction is peculiarly adapted for beating to windward, and at the same time offers no impediment to the steaming power.

11.—In a gale of wind with a heavy sea, what is the best mode of managing a steam vessel?

This must always depend on the judgment of the commanders of these vessels; there can be no kind of doubt, they act best with the wind a head or right aft, as both the paddle wheels are then at work. Should an investigation of my plans take place, I should require ten or twelve days to arrange my drawings and calculations, as the plans I submitted to the General Post Office were for forty horse power, and a vessel of one hundred tons. The vessel I would recommend for a passage of twenty leagues would have eighty horse power and one hundred and ninety tons (builders tons).

To the Chairman
of the Holyhead Roads Committee,
House of Commons.

I am, honourable Sir,
Your very obedient humble servant,
Wm. Evans.

(15.)—LETTER from *Peter Ewart*, to the Chairman of the Committee.

Sir,

Manchester, April 20th, 1822.

I HAVE the honour to acknowledge the receipt of your letter of the 21st March.

As I have not had many opportunities of personally observing the working of steam vessels, I can only give the following general answers to the queries annexed to your letter.

After having examined and compared various authentic accounts of good steam vessels which I have had opportunities of collecting, I have no doubt that the packets, Meteor and Sovereign (but especially the Meteor) of Holyhead, are better calculated than any other steam vessels I have heard of, for crossing a sea exposed to strong tides and heavy gales.

In answer to the eighth query, "In what parts do engines most frequently get out of order and break?" I wish to observe, that where accumulation of weight in a steam engine is not objected to, all the parts may be made so strong as to be in very little danger of breaking. But steam engines overloaded with weight, never work easily or economically; and much of their weight being above the waterline of the vessel, her sailing is injured by it. By the sudden pitching and straining of a vessel in strong tides and heavy gales, the working parts of a steam engine are sometimes forced out of their proper places, and violent counteractions are produced, the effects of which can only be prevented by adopting such modifications of the strength and combination of the parts, as the service for which the vessel is destined may require. I understand the Meteor and Sovereign have been employed, during the last winter, in a service which must have subjected the vessels and the engines to trials of the severest kind, and the perfections and imperfections of the whole and of the separate parts, must have been better ascertained than they could have been in any other way. It is only by such experiments that the requisite information for perfecting the whole apparatus is to be obtained, and much depends on the judgment and skill of engineers, in availing themselves of such information.

To the Chairman
of the Holyhead Roads Committee.

I have the honour to be, Sir,
Your most obedient servant,
Peter Ewart.

(16.)—ANSWERS of Sir *Robert Seppings*.

Query 1.—WITH what steam vessels are you acquainted, whether used in rivers or in the open sea?

2.—By whom were they built, and by whom were the engines made?

Answers 1. & 2.—The only steam vessels that I am acquainted with are the Sovereign and Meteor, built by Mr. Evans of Rotherhithe, who produced the drawings of their form. Their works were carried on under the particular direction of Mr. Lang, the assistant surveyor, on the system of ship-building recommended by me, and generally practised in His Majesty's navy. The engines were made by Messrs. Boulton & Watt.

3.—What

3.—What is their respective tonnage, and what the respective power of their engines?

The Sovereign is about two hundred and ten tons, and the engines of eighty horse power. The Meteor about one hundred and ninety tons, and the engines of sixty horse power.

4.—Have any of these vessels performed winter voyages at sea?
I understand they have.

5.—Supposing the length of voyage to be twenty leagues from port to port, across a sea exposed to strong tides and heavy gales, how many vessels, in your opinion, would be necessary to be maintained, so that two should sail every morning, that is, one from each port throughout the whole year; except on days when a strong cutter of one hundred tons burthen would be obliged to put three reefs in her mainsail?

This question can be more satisfactorily answered by nautical men, acquainted with the station, or by persons that have had experience with vessels propelled by the power of steam.

6.—What description of vessel, as to tonnage, form, strength of building, masts and sails, in your opinion, is the best for sea navigation?

I should recommend schooner rigged, and that the vessel should not exceed two hundred tons. In point of strength, I consider that the principle introduced in the Sovereign and Meteor should be generally adopted in all steam vessels, and in fact all other vessels, but particularly those of the packet class, as it gives safety in the event of the loss of the keel, and also a proportion of the plank of the bottom, either of which would be the destruction of a vessel constructed on the common principle. This I particularly noticed in my letter to Sir Henry Parnell, of the 28th of August 1819, wherein I stated the melancholy loss of the William and Mary packet in October 1817, which in all probability would not have taken place, had she been constructed on the principle introduced in the Sovereign and Meteor, as well also in the Model packet built at Woolwich, for the service of the Post Office, but since made over to the naval department. And as I consider the mode of filling in, or making ships solid below, of great national importance, I request to inclose a paper on that subject, addressed by me to the Royal Society, and afterwards published in their Transactions. With respect to the shape or form of vessels propelled by steam, I am of opinion that the one constructed by Mr. Lang, and now building in His Majesty's yard, Deptford, is preferable to either the Sovereign or Meteor.

7.—What description of engine, as to power, materials and general form and arrangement, and what description of boilers and paddles, in your opinion, are the best?

I should recommend the engines of Messrs. Boulton & Watt.

8.—In what parts do engines most frequently get out of order or break?

I am informed the axle and cross heads are the parts that most frequently give way.

9.—Can you suggest any improvements in the present plan of building steam vessels, and constructing their engines, boilers and paddles?

I am not aware of any particular improvement that can be made in the building of steam vessels, beyond those already stated. With respect to the engine, &c. I conceive there are others that can give more satisfactory information, it being more in the line of engineers employed directly on that particular service. An improvement in the paddles has been introduced by Mr. Lang, the assistant surveyor, by which they may be unshipped, or reduced in their dip, at pleasure.

R. Seppings.

PAPERS referred to by Sir Robert Seppings in his Answers.

On a New Principle of constructing Ships in the Mercantile Navy, by Sir Robert Seppings, F. R. S. (from the Philosophical Transactions.) Read before the Royal Society, March 9th, 1820.

SO deeply is this country in particular interested in whatever may tend to give additional safety to the number of persons, and the immense sums of money employed in commerce, that I trust I shall stand excused for again bringing to the notice of the Royal Society, the subject of the construction of ships. The description of vessels of which I am now about to treat, are those employed in our mercantile service, in the construction of which, the imperfections are such as on a close examination will, I conceive, leave but little doubt that lives and property to an immense amount, must, from time to time, have been sacrificed by the present injudicious mode of constructing these ships; and under that impression I have presumed to lay this paper before the Society.

And first, as to the principle on which mercantile ships are at present built, and particularly as regards the putting together their ribs or frames, and the arrangement of the materials.

In forming the frames or ribs, half of the timbers only are united so as to constitute any part of an arch; every alternate couple only being connected together: the intermediate two timbers (termed fillings) being unconnected with each other, and merely resting upon the outer planking, instead of giving support to it. Now, it must be very evident that ships so constructed, can by no means possess equal strength with those that have the whole of their timbers formed into frames or arches.

This loose practice is, I believe, peculiar to the English merchant ship-builder; and indeed was pursued till very lately even in his Majesty's navy, while the preferable system of connecting the ribs was common to other maritime powers.

The principle of uniting the frames, lately introduced in the construction of English ships of war, might, no doubt, be also introduced into the mercantile navy; which would give to the ships in that employ additional strength and increased durability, without adding to the expense of building.

But the present mode of joining together the several pieces of the same rib, is also highly objectionable. It is done by the introduction of a third piece, technically termed a *chock* or *wedge piece*, (Pl. I. Fig. 1, marked A.) of which pieces the number amounts to upwards of 450 in a 74 gun ship, and not less than that number in an Indiaman of 1,200 tons: (to which class of ships the drawings in this statement have reference.) Of these chocks not one in a hundred is ever replaced in the general repair of a ship; for they are not only found defective, but very generally to have communicated their own decay to the timbers to which they are attached. Besides this, the grain of the rib-pieces being much cut, to give them the curvature required, has a considerable share in weakening the general fabric. That they occasion a great consumption of materials, is obvious, as the ends of the two rib-pieces must first be cut away, and then be replaced by the chock.

This mode of putting together the frame, is also peculiar to the English ship-builder; and I find, from an old work in my possession, dedicated to George the First, that the practice was introduced in the construction of English ships about the year 1714; and having heard that so unfriendly to it was the builder (Mr. Nash) of the Royal William, that he refused to adopt it; and being desirous of ascertaining the fact, when that ship was taken to pieces at Portsmouth, in 1813, I found that she was built without the wedge pieces or chocks, to which, in a certain degree, I ascribe her strength and durability; her ribs being by her structure less grain-cut, and for want of chocks, less liable to decay in those parts where they are inserted.

The introduction of chocks was no doubt to procure that curvature which is so necessary in the formation of a ship, when crooked or compass timber became scarce; as may be seen by Pl. I. Fig. 2, which describes the shape of a piece of timber in the converted form; and by which it will also be seen, that the introduction of the chocks assists in obtaining the required curve. But this curve may equally be obtained by a different combination of materials, and at a considerable less consumption of useful timber.

The frames of a mercantile ship (on the present mode of building) before they are placed and united to each other, may be seen in Pl. I. Fig. 3, with their chocks or wedge-pieces. To the evils already stated of the present practice, may be added that of imperfect workmanship, so that the surfaces of the chocks are seldom in contact with those of the timbers; and the ends of both are frequently reduced so thin, as to split by the fastenings that are necessary to secure the planks to the ribs; and thus the ship, in the event of grounding, or even in the act of rolling, derives little support from timbers united only, in fact, by two narrow edges.

Another great defect arising out of the present plan of constructing mercantile ships is, that the ends of the lower ribs or timbers, commonly termed the lower futtocks, (Pl. I. Fig. 3. B.) are not continued across the keel C. so that no support is given in a transverse direction when the ship touches the ground; nor any aid to counteract the constant pressure of the mast. This great sacrifice of *strength and safety* is made for no other purpose than that of giving a passage for the water to the pumps.

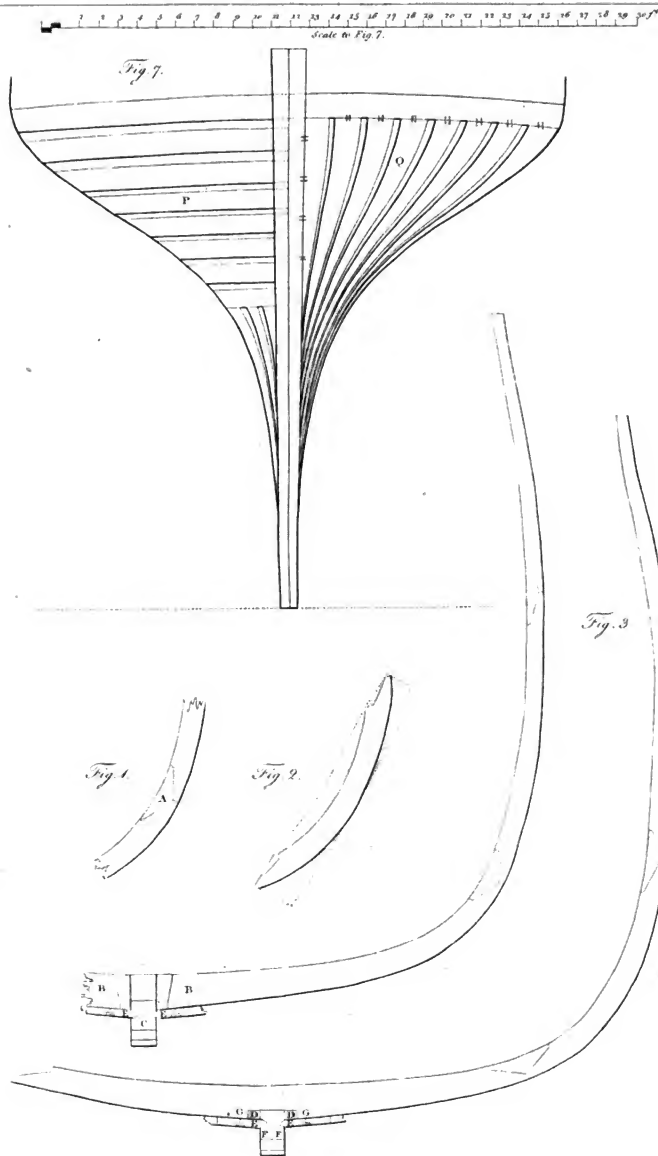
The floor timbers, which by this mode of construction are the only timbers that cross the keel, are also weakened for the same purpose, as shown at D. Pl. I. Fig. 3. This mode also makes the conveyance of the water very uncertain, for the passage is not unfrequently choked; and the pumps (from its not being practicable to continue them sufficiently down) always leave from six to eight inches of water in the ship; so that these compartments constantly contain a certain quantity of putrid bilge water, offensive and injurious to the health of those on board.

The deficiency of strength causes also an alarming insecurity in the plank of the bottom, as shown at E. Pl. I. Fig. 3, termed the garboard strake; which, consequently, has no other fastening to the general fabric, than its connection with the keel at F. Pl. I. Fig. 3. and a slight security at G. Pl. I. Fig. 3: hence it is obvious, that in the event of the keel being disturbed, the garboard strake, from its being attached to it, must share the same fate as the keel, and in that case the loss of the vessel would be inevitable.

To obviate these serious defects, is the principal object of this paper.

The principle I would recommend is explained in Pl. II. Fig. 4; by which it will be seen, that the component parts of each rib are of shorter lengths and less curvature, and consequently less grain-cut; that they are more firm and solid by the substitution of coaks or dowels, for chocks or wedge-pieces; and that the mode of connecting the lower timbers is better adapted, in the event of a ship grounding, to give support and strength to the fabric, as will appear by the line marked H.

The plan of connecting the ends of the timbers by circular dowels or coaks (as at I.) is simply that which has, from time immemorial, been practised to unite the fellyes of carriage wheels; and we learn from Mr. Wood, that the same method has been observed in joining together the separate pieces of the shafts of the stone columns in the ruins of Balbec. "Little more of this great edifice (says this author) remains, than nine lofty columns supporting their entablature. It is remarkable, that the shaft of these columns consists of three pieces most exactly joined together without cement, which is used in no part of the buildings, they being strengthened with iron pins received into a socket. How much this method con-
tributed



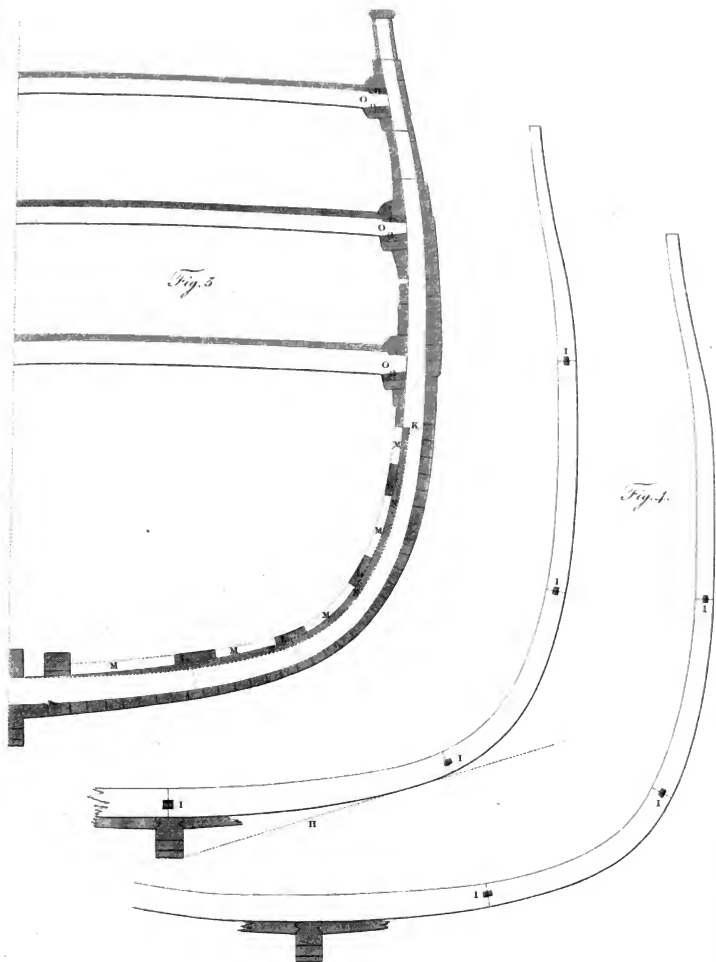
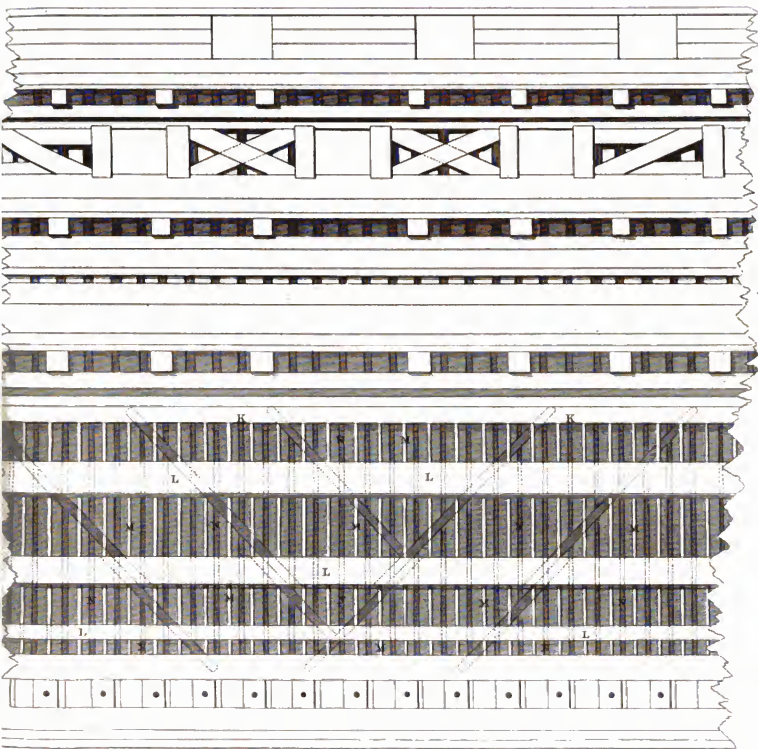


Fig. 6.



1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

"tributed to the strength of the building, is remarkably seen in the most entire temple, where a column has fallen against the wall of the cell with such violence, as to beat in the stone it fell against, and break part of the shaft, *while the joinings of the same shaft have not been in the least opened by the shock.*"

That the frame of the Thunderer (now Talavera), built on this principle, is superior in point of strength, to a frame constructed on the common system, is fully established by a report from the officers of His Majesty's Yard at Woolwich to the Navy Board, who directed them to compare the strength of the frames so united, with those of the Black Prince, constructed in the usual way with chocks or wedges.

It may be necessary to observe, that the frame of the Thunderer is composed of small timber, hitherto considered applicable only for the frames of frigates. I was prompted to attempt the introduction of the plan on which she is built, from there being a surplus store of small timber in the yard, and from a conviction, that a well combined number of small timbers, might be made equal, if not superior, both in strength and economy, to the large, overgrown, and frequently grain-cut materials, made use of in constructing the frames of large ships; and the result has shown the correctness of the principle; the adoption of which cannot fail to prove of great national advantage, in the application of sloop timber to the building of frigates, and of frigate timber to ships of the line, whenever larger timber cannot be procured. On this principle also, may frigates and small ships of war, or merchant vessels, be built of straight fir, without the assistance of oak or elm, which were formerly employed to give the necessary curvature of the sides. As it respects the general safety of the ship, it will be seen, by Fig. 5 and 6. Pl. II. III. that the timbers uniformly cross the keel; that the frame of the ship is filled so as to form one compact body to the height marked K; and that only certain internal strakes of plank, or thick-stuff, as it is termed, are introduced, which are those on the joints of the timbers, for the purpose of giving strength where every alternate timber necessarily joins, as shown at L. (Pl. III.) All the rest of the inner planking may be omitted; and dunnage battens, brought in a perpendicular direction, upon the timbers *between* the plank, as shown at M, forming regular spaces between each, as is usual at present *upon* the plank; thereby giving an increase of stowage in proportion to the thickness of the plank omitted. Water-courses, as shown by dotted lines at N, are to be left in the joints of the timber under the plank, for the purpose of conveying the water to the pumps; which, by this plan, will reach below the water, instead of being some inches above, as is the case with the present mode, before described; consequently, by the proposed system, no stagnant water will remain; and farther, the timber passage, or water-course, will be one smooth uniform channel, which can be cleared with ease, should it be required, whenever the hold is unstowed; whereas at present it is inaccessible in places, and forms compartments for putrid water, without there being any means of removing it.

It is obvious, that a ship on the principle I have here recommended, may sustain the loss of certain planks of the bottom, and also the keel, (which has frequently been found to have happened to ships of war on their being taken into dock) and still reach the place of her destination; when the loss of *either*, would be the destruction of a ship built on the present mode. It will be evident also, that a ship constructed as now recommended, possesses greater stowage, and more space for leakage, than by the old plan; by the omission of the useless inner planking, and by laying the kentlage on dunnage, leaving a space for the water, which was formerly occupied by the inner lining. This dunnage in the bilge may be formed with the iron kentlage, and thereby serve as ballast, for which it is well calculated from its situation; and by its occupying a space heretofore forming part of the fabric of the ship, will give an increase of stowage, as before stated.

The best mode of closing the openings between the timbers, is by filling the intermediate spaces with pieces of wood, about three inches in depth, of such lengths as the inferior conversions will supply, abundance of which may be procured from the offal. These fillings are to be well caulked, after which the exterior plank is to be brought on. When the works are going on within board, similar pieces are to be fitted internally, and afterwards taken out for the purpose of filling the spaces between the pieces so fitted, with a mixture of Parker's Roman cement and drift sand, in the following proportions, viz.

Parker's Roman cement - - - two thirds,
Drift sand - - - - - one-third,

previously paying the opening well with coal tar. Where there is sufficient space, a brick, or part of one, may be introduced, provided there is room for cement between it and the timbers. When filled in to within about two inches of the surface of the frame, the pieces of three inches already fitted and taken out, are to be well driven in and caulked, and by so doing, no space will be left unoccupied. If considered desirable, these pieces may be driven below the surface of the timber, thereby leaving water-courses to convey the leakage to the pumps in channels. And prior to launching or undocking of ships, built on the principle I have recommended, it has been the practice to inject the part filled in with mineral tar*, by means of a simple forcing pump, boring holes in the joints of the timbers for the introduction of the pipe. By following this method, the air will be excluded, which, as experience has shown, tends much to the durability of the fabric; confirming the assertions made by doctor Hales on this subject, in his work on Ventilators, published in 1750,

* *Mem.*—With respect to the injection with coal tar, it is necessary to observe, that, prior to the ship being injected with this matter, it should undergo a preparation to deprive it in a great degree of smell.

and

and also of doctor Henry, in his work on the elements of Chemistry. If what is here recommended be attended to, and mercantile ships were built under roofs, as ships of war now are, durability would be obtained in addition to safety, from the mode of their construction.

The beams are to be attached to the sides, as shown at O. Pl. II. Fig. 5. rendering wood knees unnecessary, and requiring only a small number of those of iron.

Fig. 7. Pl. I. marked P, describes the old principle of framing the stern with transoms. Q, the new principle, with timbers similar to the bow, omitting the transoms below the wing or upper transom; and by introducing the new principle on which the floors are made, the necessity of using valuable compass, or crooked timber, hitherto required, and with difficulty procured for these purposes, is avoided. Uniform support will thus be given, and also an increase of room for stowage.

In large mercantile ships above 500 tons, I would recommend that plate-iron be laid diagonally, as shown in Pl. III.

The principle now recommended will cause a decrease in the consumption of materials, and the difficulty of procuring the necessary curvature will be obviated. It also affords protection from worms externally, and vermin internally. Leaks may be more easily discovered and stopped than by the old method; and in point of additional strength, there can be no doubt. But were farther proof required, I need only state, that the *Malabar*, of 74 guns, built at Bombay, arrived at Portsmouth in October last, loaded to her upper deck with timber, and during her passage encountered four heavy gales of wind, without showing a symptom of weakness, as will appear by the following extract from the Survey made by the officers of Plymouth yard, on that ship, by order of the Lords Commissioners of the Admiralty.

"When we consider the nature of the lading that this ship has brought home, with the temporary security to the beams of all the decks, except the orlop, and that on her passage she encountered four very severe gales of wind, it must, we presume, be very gratifying to your Honourable Board to find, that she does not indicate any past symptoms of weakness or straining in any part."

This ship had no other attachment for her beams than the internal hoops and thick waterway; the remainder of her security, the iron knees, being omitted, (from the difficulty of procuring them in India) until her arrival in this country; thus supporting her cargo without the aid of knees, either of wood or iron.

The advantages of this plain, but important subject, particularly in point of safety, has induced me to bring it before the Society, in the hope that its utility and importance to this great maritime nation, may plead an excuse for the absence of abstract science, to which the attention of the Society may, perhaps, be more peculiarly directed.

(17.)—ANSWERS of Mr. John Gladstone respecting Steam Navigation.

Sir,

Castle Douglas, 4th May 1821.

I duly received your circular, containing queries to be answered respecting steam navigation. My observations and improvements have been principally directed to so much of the 7th and 9th queries, as relate to paddles.

I am happy, however, in having an opportunity of laying my improvements in that part of the machinery, before so intelligent and respectable a body as a Committee of the House of Commons.

I have the honour to be, Sir,

Your most respectful humble servant,

To Sir Henry Parnell, Bart.

John Gladstone.

In sailing in steam vessels I have carefully ascertained the dimensions of their paddle wheels, with their velocity, and the distance the vessel was propelled in proportion to the space described by the paddles during each revolution, and found in all cases where I have had an opportunity of examining, that the vessel did not move more than at the rate of half the velocity of the paddles, owing to the following defects:—

1st.—The surface of the paddles on the common wheel, which comes in contact with the water, is not in proportion to the dimensions of the vessel or the power of the engine, and consequently a great deal of power is lost in displacing water.

2d.—The oblique position of the paddles, both in entering and leaving the water, consumes a considerable portion of the power of the engine and strains the vessel.

After repeated experiments, I have found that these imperfections may be obviated, by employing a pair of wheels on each side of the vessel, and having two endless chains acting on them, with such a number of paddles fixed on these chains, that the surface applying in the water shall not be less than three-fourths of the greatest section of the vessel under water, and the curve which the chains are made to assume being such, that the paddles will enter and leave the water in a position nearly perpendicular to its surface.

These chains are so made that they take a fast hold of the wheels that communicate the motion, and are quite flexible in passing over the wheels, while at the same time they will not bend sideways.

In common paddle wheels, the larger their diameter is the paddles apply with the greater effect, while on my plan of chain paddles, the superior advantage which they possess is derived from the curve and length of the chains between the wheels, (which, besides obviating the oblique

oblique action on the water of the paddles on the common wheels, will also, in a rough sea, when these paddles are alternately immersed too deep in the water and raised altogether out of it, as it can never happen but most of the paddles on the curve of the chain will act on the water, and in most cases the whole of the external apparatus may be so placed on the sides of the vessel that the deck may project over it and cover it in.

Having ascertained what is stated above by a number of accurate experiments, and lately repeated them at Liverpool, in the presence of a number of witnesses, of which the following is the result.

In applying the common paddle wheel to the boat the effect was, that while each paddle moved through a space of 743 yards, the boat was propelled only 450 yards, leaving a difference of 293 yards between the spaces passed over.

I then applied the same wheels to the same boat, with the chain paddles of my invention, and they were found to propel the boat 706 yards in the same time, and while they passed through the same space of 743 yards (with one-fourth less power applied), making a difference of 37 yards only, or about one-twentieth of the space that would have been passed over, supposing the boat to have been a coach with toothed wheels, and the water a rack or toothed railway.

The result therefore is, that the velocity of the vessel with chain paddles is to that of one with the common paddle wheels, as 706 is to 450, or rather more than as three is to two; but if equal power had been applied in both cases, the result I am satisfied would have been as nine is to five.

I refer to a boat lying in Wilson & Gladstone's ship-yard, head of Queen's Dock, Liverpool, on which the above experiments were made, and on which they may be repeated, the boat being fitted up for that purpose.

The wheels, chains and paddles are complete as to form, materials and proportion; but the boat is a good deal too short and broad, which however hurts the appearance rather than the accuracy of the experiments.

J. G.

(18.)—ANSWERS of *John Wood & Co.* respecting Steam Navigation, enclosing a List of Steam Vessels built by them at Port Glasgow.

Sir,

Port Glasgow, 1st May 1822.

WE received your letter of the 21st ult. and subjoin what occurs to us in answer to the various queries contained therein.

Query 1.—With what steam vessels are you acquainted, whether used in rivers or the open sea?

2.—By whom were they built, and by whom were the engines made?

3.—What is their tonnage, and what the respective power of their engines?

Answers to Q. 1, 2, 3.—The vessels with which we have had an opportunity of being particularly acquainted are those which we have built, and with these our acquaintance for the most part applies to forming and building the vessels.—We inclose a list of them.

4.—Have any of these vessels performed winter voyages at sea?

Of the vessels above mentioned, the *Thane of Fife*, and the *Edinburgh Castle* upon the Frith of Forth, are the only two which have been kept constantly going to sea in an exposed situation during the winter; they have done their work well.

Besides these, we know that the *Rob Roy*, for several winters, and the *Eclipse* during the last winter, have been making passages constantly between Belfast and Glasgow, in the most severe weather, and have proved more fit to keep the sea than sailing vessels.

5.—Supposing the length of the voyage to be twenty leagues from port to port, across a sea exposed to strong tides and heavy gales, how many vessels, in your opinion, would be necessary to be maintained, so that two should sail every morning, that is, one from each port throughout the whole year; except on days when a strong cutter of one hundred tons burthen would be obliged to put three reefs in her mainsail?

We consider four vessels the proper number; and we think that steam vessels may be made to perform the passage every day of the year without exception.

6.—What description of vessel, as to tonnage, form, strength of building, masts and sails, in your opinion is the best for sea navigation?

We consider the largest vessels the best for sea navigation. For such a station as described in Q. 5, we would consider the size should be two hundred and fifty tons, two engines of forty horse power each; the vessels formed with a fine entrance and run; sharp raking bow, both below and above; a broad transom, not too high placed; a good rise in the floor, limited by the draught of water, and the occasion of taking the ground; strong built amidships below, light built above, and forward and aft; rigged with light gaff sails, with a large square-sail forward.

We would remark in favour of light masts and sails, besides these being the most suitable for a steam vessel, which depends only in part upon her sails, and has often to go head to wind, that during a gale of wind is the time (if ever) in which the safety of the vessel is to depend on the sails, if the vessel should be left to these alone, and that for any vessel whatever in this situation such a rig is what would be considered the most desirable, these being as it were reefed sails without the disadvantage of heavy spars or rigging aloft.

7.—What description of engine, as to power, materials, and general form and arrangement, and what description of boilers and paddles in your opinion are the best?

We consider a powerful proportion of engine is necessary for vessels employed as described in Q. 5, as they must often have to force a passage against the wind when blowing very hard, and these, as for any other description of work, to be the best and most perfectly formed engines.

The most usual connecting machinery for applying the power of the engines to turn the paddle shafts, is side working beams, connecting rods and cranks, with or without connecting wheels. In some vessels the side working beams have been left out. It seems to us a matter of indifference, whether the working beams are used or not; but provided the proper corresponding length of stroke of piston and diameter of paddle wheel can be had, it seems very desirable to avoid connecting wheels, as being liable to be broken by the stroke of the sea. All the connecting machinery should certainly be very strong, we venture to say twice the strength for ordinary work on shore; wrought iron, although inferior to cast iron in *stiffness*, is less apt to break from a jerk, and we think should be used wherever it is suitable.

8.—In what parts do engines most frequently get out of order or break?

Paddle shafts, connecting wheels, beams and cross-heads, are liable to be broken by the jerk of the sea, and should be very strong.

Large floats, while they give the best application of the power of the engines, expose the intermediate machinery to a much more severe trial than small floats, and consequently require the working parts particularly strong.

9.—Can you suggest any improvements on the present plan of building steam vessels, and constructing their engines, boilers and paddles?

As to the form, &c. of the vessels, we think that improvements might still be obtained from a set of good experiments to measure accurately the degree of advantage which one form, &c. possesses over another; but we think the principles now generally followed on the coast of St. George's Channel nearly the best.

It

LIST of Steam Vessels built by John Wood & Co. Port Glasgow. - - - -

	Length aloft, over Stem & Post.		Breadth.		Tonnage— Register as a Ship.	HorsePower.	Engines.
	Ft.	In.	Ft.	In.	Tons.		
Comet - - - -	43	6	11	6	25	4	Mr. Bell - - -
Elizabeth - - - -	58	9	12	0	40	9	Mr. Thomson - -
Clyde - - - -	76	0	14	0	69	14	Mr. Robertson -
Glasgow - - - -	72	0	15	0	74	16	Mr. Cook - - -
Caledonia - - - -	95	6	15	0	102	-	Messrs. Boulton & Watt
Argyle - - - -	79	0	15	6	89	34	Greenhead & Co. - -
Neptune - - - -	78	0	15	6	88	42	- - - - -
Wallace - - - -	80	0	16	0	95	22	Mr. M'Arthur - -
Albion - - - -	82	0	15	6	92	20	Mr. Cook - - -
Tug - - - -	73	0	17	0	95	-	Mr. M'Arthur - -
Defiance - - - -	58	0	14	0	51	14	Mr. Robertson - -
Marquis of Bute - - -	65	0	14	0	59	14	- Ditto - - -
Robert Burns - - -	76	0	14	6	73	24	Mr. Napier - - -
Port Glasgow - - -	76	0	14	0	70	16	Mr. Murdoch - -
Talbot - - - -	92	0	17	11	139½	60	Mr. Napier - - -

It seems extremely desirable to have the machinery so constructed that the speed of the paddles might in all situations be proportioned to that of the vessel, as that varies very much. A steam vessel which in a strong breeze of wind would go eleven miles an hour before the wind, if going against the wind and heavy head sea, or with heavy vessels in tow, would possibly not be able to go more than three miles per hour; in such cases, which are constantly occurring, there is on the present plan a very great loss of work from the engine being overpowered and brought down to even less than half speed, which we consider losing more than half work of the engines, as the vacuum is then very imperfect.

The most obvious plan to obtain this is, to have different sets of connecting wheels with the proportionate number of teeth varied, to be thrown off and on at pleasure, as in a crane. This plan is certainly liable to objection.

We will only say farther on this head that the power of so varying the speed of the paddles appears to us decidedly to be very desirable; Engineers are best able to give the best method.

10.—Can you suggest any plan for enabling a steam vessel to use sails, so as to be able to beat to windward in case her engine should be out of order, at the same time offering but little impediment to her steaming power?

To throw the paddle wheels loose, and allow them to turn round, is the only good method which occurs to us.

11.—In a gale of wind with a heavy sea, what is the best mode of managing a steam vessel?

Keep either the one end or other as nearly as possible to the wind.

We are, Sir, your very obedient servants,

J. & C. Wood.

- - - LIST of Steam Vessels built by John Wood & Co. Port Glasgow.

When Launched.	Stations.	
1812: July 24 - - -	Clyde - - - -	--- The first steam boat put to use in Great Britain, laid down the same year that the great comet appeared.
November 20 -	Now on the Mersey.	
1813: February 6 - -	Glasgow and Greenock -	--- Lately rebuilt, sharper and deeper.
September 14 -	Largs and Glasgow -	--- Built originally with a fair moderately sharp body. Had afterwards a new sharp bow lengthened five feet; sailing improved.
1815: April 27 - - -	Copenhagen.	
July 10 - - -	Glasgow and Inverary -	--- Built at first with a square sailing barge bottom; her bottom twice altered, first time to a round Dutch form, afterwards sharpened; sailing improved both times.
1816: February 2 - -	Glasgow and Inverary -	--- Neptune's bottom rebuilt, sharpened; sailing improved.
February 3 - -	Newhaven and Kinghorn -	--- Built at first with a sailing barge bottom, square; afterwards rebuilt with a round bottom; sailing improved.
{Keel laid, Feb. 4. Launched Mar. 15.}	Largs and Glasgow -	--- Built originally with a fair moderately sharp body; entrance similar to a merchant vessel intended for sailing well; afterwards the bottom was entirely rebuilt of a sharper form; engine the same; sailing decidedly improved.
1817: May 11 - - -	Frith of Forth.	
Mar. 22 - - -	Glasgow and Lochgilhead.	
1818: April 15 - - -	Glasgow and Gourrock.	
1819: January —	Glasgow and Helensburgh.	
April 20 - - -	- - Ditto.	
- - -	Formerly Holyhead and Dublin.	

(continued)

	Length aloft, over Stem & Post.		Breadth.		Tonnage Register as a Ship.	Horse Power.	Engines.
	Fr.	In.	Fr.	In.	Tons.		
Inverary Castle - - -	95	6	16	0	114 $\frac{1}{2}$	40	Mr. M'Arthur - -
Caledonia - - -	85	0	14	6	84	30	Mr. Napier - - -
Edinburgh Castle - -	90	0	18	10	148	40	Mr. Cook - - -
Thane of Fife - - -	91	6	18	8	148	40	- Ditto - - -
Highlander - - -	65	0	15	0	67	18	Greenhead & Co. -
James Watt - - -	146	0	25	8	448 $\frac{1}{2}$	100	Messrs. Boulton & Watt
Larga - - -	93	6	17	0	126	32	Mr. Girdwood - -
Vessels not built by J. Wood & Co. but							
Greenock - - - -	76		14		70	12	Messrs. Boulton & Watt
Oscar - - - about	76		14		70	12	Mr. Robertson - -
Britannia - - -	84		16	0	100	40	Mr. Cook - - -

(19).—EXTRACTS from the Answers of Messrs. *Hurry & Co.* respecting Steam Navigation.

Sir,

Liverpool, 2d May 1822.

IN reply to the inquiries conveyed in your letter of the 21st ult. we beg leave to state as follows; viz.

Answer 4.—The Greenock and Irish boats have been out in very heavy gales of wind, but have generally been laid up from November to March.

5.—We should consider four boats absolutely necessary to secure the certainty of a daily communication, which would leave a spare boat at each port.

6.—We are of opinion that a boat of two hundred tons, with a fine bottom, not too heavy in her frame, and schooner rigged, best for sea navigation.

7.—We are of opinion that two engines amounting to ninety horse power are the best suited to the vessel before mentioned.

9.—Messrs. Fawcett and Littledale's various improvements upon the steam engine render them very perfect, and we are not aware how any improvement could be made, unless the paddles could be made to feather, so as to prevent the obstacle opposed by them to the water when the vessel is using her sails only, or when at anchor in a strong tide; or if the paddles could be thrown out of gear, so as to allow them to run round, which would considerably reduce the obstruction, and which we think a clever engineer might effect.

10.—If the suggestion in reply to No. 9, could be effected, a sharp vessel would, under her schooner sails, turn to windward if at any time her steam was out of order.

We remain, Sir, your most obedient servants,

Wm. Hurry & Co.

(20).—ANSWERS of Mr. *J. Cook* respecting Steam Navigation.

Glasgow, 30th April 1822.

Query 1.—WITH what steam vessels are you acquainted; whether used in rivers, or in the open sea?

Answer.—The *Lady of the Lake*, built in 1814, during 1815 plied on the Frith of Forth, betwixt Leith and Stirling; crossed the North Sea to Hamburg in 1816, plied in 1817 and 1818 on the Elbe, betwixt Hamburg and Cuxhaven; recrossed the North Sea from Cuxhaven to Leith in the fall of the year 1818; has plied ever since on the Frith of Forth, betwixt Leith and Stirling, summer and winter, except for a short time every season, necessary for repairs, cleansing and painting. She commenced plying last season on the 12th of March

When Launched.	Stations.	
1820 - - -	Glasgow and Inverary.	
1821 :		
February - - -	Glasgow and Helensburgh.	
Ditto - - -	Newhaven and Kinghorn.	
Ditto - - -		
Ditto - - -	Fort William and Glasgow.	
June - - -	London and Edinburgh.	
1822 :		
March - - -	Glasgow and Largs.	

altered by them to improve their speed.

1818 :		
May - - -	Glasgow and Helensburgh	- - - Entirely rebuilt from a square form, being our first experiment of that sort; was very much improved in speed.
1819 - - -	Glasgow and Gourrock -	- - - Was lengthened six feet forward and eight feet abaft, with a fine entrance and run; went much easier through the water.
1820 - - -	Glasgow and Campbeltown	- - - Was altered and sharpened in bow and run; bow lengthened at same time; was much improved in speed.

March 1821, and was laid up this season for repairs on the 17th of February last, making a voyage to and from Leith and Stirling, a distance of ninety-eight miles, every lawful day during the above period of eleven months and five days. She missed only one voyage, to and from, during that time, occasioned by some accident, or by stress of weather.

The Sir William Wallace, the Edinburgh Castle, and the Thane of Fife, belonging to the trustees on the Newhaven and Fife ferries, ply summer and winter on the above ferries, say from Newhaven to Dysart, Kirkcaldy, Kinghorn, and Bruntisland, and *vice versa*, under very unfavourable circumstances, having generally a cross wind with a rolling short sea, and sometimes very tempestuous. Notwithstanding all the heavy gales that have been this last winter and spring, there was only one day that some one or other of these vessels did not cross and recross.

The Britannia plies betwixt Glasgow and Campbeltown summer and winter.

The Eclipse plies betwixt Glasgow and Belfast summer and winter. There are a great number more that ply on the rivers and Friths of Clyde and Forth, summer and winter.

2.—By whom were they built; and by whom were the engines made?

The Lady of the Lake was built by Mr. Gray, ship-builder, Kincardine; the engine made by James Cook, engineer, Glasgow.

The Sir William Wallace, built by Messrs. John Wood & Co. ship-builders, Port Glasgow; the engine made by Mr. Duncan M'Arthur, Glasgow.

The Edinburgh Castle, and the Thane of Fife, built by Messrs. John Wood & Co. Port Glasgow; the steam engines made by James Cook, Glasgow.

The Britannia, built by Messrs. Woods, as above, and the steam engines made by James Cook, as above.

The Eclipse, built by Mr. Steel, ship-builder, Greenock; steam engines made by Mr. David Napier, Glasgow.

3.—What is their respective tonnage, and what the respective power of their engines?

The Lady of the Lake, seventy-six tons; engine, twenty horses power.

The Sir William Wallace, ninety tons; steam engine, thirty-two horses power.

The Edinburgh Castle, one hundred and forty-five tons; two engines of twenty horses power each.

The Thane of Fife, one hundred and forty-eight tons; two engines of twenty horses power each.

The Britannia, one hundred tons; two engines of sixteen horses power each.

The Eclipse, I believe, one hundred and sixteen tons; two engines of thirty horses power each.

4.—Have any of these vessels performed winter voyages at sea?

This is taken notice of, in answer to query 1.

5.—Supposing the length of voyage to be twenty leagues from port to port, across a sea exposed to strong tides and heavy gales, how many vessels, in your opinion, would be necessary to be maintained, so that two should sail every morning, that is,

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3 L

one

one from each port throughout the whole year; except on days when a strong cutter of one hundred tons burthen would be obliged to put three reefs in her mainsail?

Four; perhaps three might do, but four is more advisable when certainty is required, particularly in winter.

6.—What description of vessel, as to tonnage, form, strength of building, masts and sails, in your opinion, is the best for sea navigation?

From one hundred and sixty to one hundred and eighty tons, built with a scantling for a sailing vessel of twice that tonnage; eighteen to nineteen feet beam; to draw from eight to eight and a half feet water; clean run aft; very full forward at the waterline and upwards; as little height above the water as circumstances will allow; no more masts and sails than sufficient to give the vessel steerage way, with a light breeze, I consider as best for such a passage, as above referred to.

7.—What description of engine, as to power, materials, and general form and arrangement, and what description of boilers and paddles, in your opinion, are the best?

Two condensing steam engines, from thirty-six to forty horses power each; all the shafts and spindles of best malleable iron; the air-pump, buckets, rods, and valves, to be of copper and brass, as well as all the other small parts subject to be acted on by the water; each engine to have two side or walking beams, placed as low in the vessel as possible; three plate-iron boilers, with two furnaces in each; the paddle-shafts, arms, and rings, to be of the best malleable iron, with timber floats or impellers; the paddles not less than sixteen feet in diameter, and to be immersed from three feet one-third to three feet two-thirds in smooth water.

8.—In what parts do the engines most frequently get out of order, or break?

All the brasses and bushes, and those small parts that are subject to the action of the salt water; the flues of the boilers; and the floats of the paddles.

9.—Can you suggest any improvements in the present plan of building steam vessels, and constructing their engines, boilers, and paddles?

The answer to query 7, embraces what I have to say on this head.

10.—Can you suggest any plan for enabling a steam vessel to use sails, so as to be able to beat to windward, in case her engine should be out of order, at the same time offering but little impediment to her steaming power?

Disengaging the paddles from the engines, and other machinery, and having very low masts, with fore and aft sails, will produce the effect wanted.

11.—In a gale of wind, with a heavy sea, what is the best mode of managing a steam vessel?

In my opinion, no general rule of management can be laid down. The commander must act at all times according to circumstances; but in a very heavy gale and tempestuous sea, where safety alone is the object, to steer right in the wind's eye is the best, that is, supposing that the engines are able to give the vessel a little head-way against the wind and sea, which ought to be the case.

James Cook.

(21.)—ANSWERS of *Thomas Stewart Traill, Esq.* respecting Steam Navigation.

Sir,

THE following remarks are intended as answers to the questions which you did me the honor to address to me through your printed letter, as far as they can be answered by one, who is neither a seaman, nor a professed engineer:

Query 1.—With what steam vessels are you acquainted, whether used in rivers, or in the open sea?

Answer.—I have sailed in the following steam vessels:

3	which ply between Liverpool and Birkenhead	} All in the river Mersey.
1	Tranmore	
2	Eastham	
1	Runcora	
1	Bagillt, in Flintshire.	
1	Portpatrick.	
1	which went from Liverpool to Anglesey.	
1	from Howth Harbour to Holyhead.	

11

I have made innumerable trips in the steam vessels on the Mersey, and have inspected the machinery of several vessels, not included in the above list; as those which ply between Liverpool and Glasgow, and from the former place to Dublin.

2.—By

2.—By whom were they built, and by whom were the engines made?

The steam vessels on the Mersey were almost all built in Liverpool; some of the best by Mr. Mottershead, and one by Dawson and Pearson. The engines made in Liverpool are all either the work of Fawcett and Littledale, or of J. Dove and Co. The three Scotch vessels with which I am best acquainted (the Robert Bruce, the Superb, the Majestic) were built by Mr. John Scott and Sons, of Greenock, who have built many on the Clyde also, and some of the Irish boats: the engines of these have been made in Glasgow, as I am informed. These three vessels were by far the largest which entered our river, until lately, when two fine steam packets have been launched here, of a size between the middle and largest of the Greenock vessels already mentioned. One of these (the St. Patrick) was built by Mottershead; the other (the St. George) by Dawson and Pearson; the engines by Fawcett and Littledale: they are intended to run between Liverpool, Dublin, Waterford, and Milford Haven. The Cambria, a fine vessel, which goes to Bagillt, in Wales, was built by Mottershead; engines, by Fawcett and Littledale.

3.—What is their respective tonnage, and what the respective power of their engines?

1. The steam vessels on the Mersey are all small, varying from about fifty tons to sixty tons register; their engines are estimated from sixteen to twenty horse power: one is said to have a twenty-two horse power engine, but I think it overrated. None of them have more than one engine.

2. The Robert Bruce, now burnt, was one hundred and ninety tons register; had two engines of thirty horse power each; consumed about half a ton of coals per hour; average speed, in smooth water, from seven to eight miles per hour; crew twelve, including engineers.

3. The Superb, two hundred and forty-one tons register; two thirty-five horse power engines; consumes three-fourths of a ton of coals per hour; speed nine miles per hour; crew fourteen, with engineers.

4. Majestic, three hundred and fifty tons register; two engines of fifty horse power each; consumes one ton of coals per hour; speed from ten to ten and a half miles per hour. This vessel has repeatedly made the passage from Greenock to Liverpool in twenty-two hours, a distance of two hundred and forty miles. I think that the Scotch engines are all higher rated, in comparison to Watt's method, than they should be.

5. Cambria, 86½ tons register; two engines of about twenty-five horse power each; cylinder thirty inches; stroke of engine thirty inches. This boat is well built, and is an excellent sea boat: her length ninety-one feet two inches, breadth seventeen feet six inches, depth eight feet four inches. Built by Mottershead; engines by Fawcett and Littledale.

6. St. Patrick, two hundred and ninety-eight tons, builders measure, which will probably be no more than two hundred register tonnage; length one hundred and thirty feet, breadth twenty-two feet one inch, depth thirteen feet eight inches; two engines of forty-two inch cylinder, estimated at fifty horse power each; stroke of the engine forty-two inches. Built by Mottershead; engines by Fawcett.

7. St. George, similar in tonnage and power. Built by Dawson and Pearson; engines by Fawcett and Littledale. Builders measure three hundred and twelve tons; not yet registered.

8. Duke of Lancaster, tonnage ninety-four tons register; length one hundred and three feet, breadth seventeen feet, depth nine feet six inches; engines same as those of the Cambria. This vessel is very *crank*, owing to her deficient breadth to her other proportions; she *heels over* much in a stiff breeze, even when her sails are not up. Engines by Fawcett and Littledale.

9. Albion, 103½ register tons; length one hundred and three feet six inches, breadth eighteen feet one inch, depth nine feet six inches. Engines have thirty-two inch cylinders; stroke thirty-three inches.

10. Prince Llewellyn, builders measurement one hundred and seventy-one tons; not yet registered. Engines have thirty-four inch cylinders; will be soon ready for sea.

4.—Have any of these vessels performed winter voyages?

The vessels on the Mersey have plied all winter. The steam packets which ply between Liverpool and Greenock, and Ireland, have often encountered very severe weather in spring and autumn; but have not run during winter, chiefly because at that season they cannot defray their expenses. I was exposed to a violent storm in the Robert Bruce, about three years ago, and was surprised at the ease with which she wrought in a very heavy sea, and the much less motion she had than a sailing vessel would have in similar circumstances. Contrary to my expectation her decks were not inundated, we could walk tolerably on them, and even books in open shelves in the cabin were not displaced; circumstances which also astonished Captain Scoresby, jun. who accompanied me. In the worst of the gale we made near half a mile per hour against a heavy head-sea and a violent gale at west, in approaching the lale of Man from Liverpool.

The Cambria has plied all the winter between Liverpool and Bagillt, in Flintshire: she sailed in some heavy gales, and was very seldom prevented from going by the worst weather, in a season remarkable for storms. I encountered another gale in this vessel last winter, and we gained port when no sailing vessel could have attempted to face it.

5.—Supposing the length of voyage to be twenty leagues from port to port, across a sea exposed to strong tides and heavy gales; in your opinion, how many vessels would be necessary to be maintained, so that two should sail every morning, that is,

one from each port throughout the whole year; except on days when a strong cutter of one hundred tons burthen would be obliged to put three reefs in her mainsail?

This question I cannot presume to answer; it requires nautical skill and local knowledge beyond my opportunities.

6.—What description of vessel, as to tonnage, form, strength of building, masts and sails, in your opinion, is best for sea navigation?

The opinion of a landsman on such matters, is perhaps of little importance; but if I were permitted to speak from my limited experience, I should think, that for communication between Holyhead and Ireland, a vessel of from one hundred to one hundred and fifty tons register would be most suitable both for mails and passengers. A vessel that size contends more advantageously with a head sea than a shorter vessel. This size will permit the use of powerful engines, and it will not be inconvenient in leaving and coming into port. The *St. Patrick* seems to me a beautiful model for a steam vessel; and the utility of having given her powerful engines, has been proved by her superior sailing. She lately came from Dublin to Liverpool in thirteen hours and a half against a stiff breeze of east wind; which is as much as the fastest sailing packet could have done, under the most favourable circumstances of winds and weather. A steam boat need not draw much water; indeed, great depth must be prejudicial to her running; she should have *straight waterways*, and should have considerable breadth; because, if she is *crank*, or has not stability, every motion of the passengers on deck will impede her way, by causing her to *heel* much; in which case, one of her paddles will be too deeply buried in the water, while the other is too far raised out of it; and much power will be thus lost.

Short masts seem all that a steam vessel requires, for she can seldom crowd sail with advantage, unless the wind be light; for if pressed down with sails, her paddles become comparatively less powerful; but some sail is necessary, in case of accidents to her machinery; and also to assist her *going* in certain cases. The handiness of the *schooner rig*, or *gaff sails*, has caused their adoption in most steam vessels; and the masts are furnished with yards for occasionally hoisting a square sail, when the wind is *abast*. Moderate sail materially assists the steam in propelling the vessel; but I do not think that much benefit has ever been derived from any kind of *topsail* on steam vessels.

A steam vessel should be built of the best materials, and be very strongly put together. This is not only necessary on account of the great weight accumulated in a small space, but because the treacherous jarring produced by the motion of the best constructed engine, is very apt to loosen the seams and bolting of the knees and beams. I should think *Sepings's* plan of *diagonal framing* and *trussing* admirably suited for steam boats of all sorts.

7.—What description of engine, as to power, materials, and general form and arrangement, and what description of boilers and paddles, in your opinion, are the best?

The only engine which should be used in steam navigation is the double-stroke engine (Watt's invention) of low pressure. I do not think that boilers of copper have any so decided advantage over those of the best hammered iron, as to be equivalent to the great increase of price; and in the strong fires used in steam vessels, they would be very liable to be much injured. Cast iron boilers should never be employed; nor are they, in any instance which has fallen under my observation. Experience has taught our engineers very convenient and neat modes of arranging the parts of engines in steam vessels; and perhaps little improvement can be expected in this respect. The comparatively small space occupied by cast iron, has rendered this material, almost exclusively, that employed in the working parts of such steam engines. No good method has been yet devised for superseding the use of the beam, in converting a reciprocating into a rotary motion. The revolving engine, which has lately been revived in America, and claimed as a new discovery, does no good; it only substitutes the weight of two revolving cylinders for the beam. The engineer who can dispense with the beam, will add much to the power of the steam engine. The chimney is an awkward appendage to a steam vessel; but I know no method of supplying the necessary draught to the fire, which is superior to the common chimney now in use.

The construction of the boilers, in most of the steam vessels, especially the early ones, is faulty: when the flues pass zig-zag through the boiler, there is considerable economy of fuel; but this renders it less easy to repair or clean out the boiler; and from the defective construction of the mouth pieces, or entrance to the grates, much fuel escapes combustion in the form of smoke. The columns of black smoke poured out by our steam vessels, are very annoying and wasteful; but the difficulty of finding *sufficient room* for the introduction of the most approved methods of consuming smoke, in a steam vessel, will probably render any attempt at this less perfect than on shore; much, however, I think, might be done by accommodating Josiah Parkes's plan to the confine dspace allotted to a steam vessel's boiler; much fuel might thus be saved; but the excellent method of *firing* introduced by Parkes, probably could not be used, with all the advantages it possesses on shore.

The power of the engine must depend on the size of the vessel, something on her form, on the perfection of the machinery, and the strength of the coals employed. It will, generally speaking, be most advantageous to have an engine rather *over than under its work*: for the elasticity of the steam, in the latter case, can only be kept up by a violent fire, and great waste of fuel. In registering steam vessels, I am told that a considerable allowance is now made for the space occupied by the machinery; so that some of the last built vessels have a comparatively lower register for their measurement, than the earlier ones. Thus, it appears to me, that the tonnage of the *Robert Bruce*, *Superb* and *Majestic*, is estimated proportionally higher than that of the *St. Patrick* and *St. George*. According

to what I have seen, I should be disposed to regard the following statement of engine power requisite for the annexed tonnage :

100 tons register, two engines with 32 inch cylinders, and a stroke of 32 inches.	
200 - - - - - 42 - - - - - 42 —	
300 - - - - - 45 - - - - - 45 —	

With respect to paddles.—The chief imperfection on the common construction is, that during a part of their revolution, the paddles attached to the circumference of a wheel, not only do not impel the vessel, but actually retard her; and the different modes by which the paddle boards, or floats, are kept perpendicular to the plane of the water, have been devised to obviate this imperfection.

I am acquainted with two different methods by which this has been effected.

In one, the invention, if I mistake not, of the late Mr. Buchanan, by means of an eccentric motion, adapted to a frame to which the floats were attached, they are kept vertical during the whole revolution of the wheels. The principle is ingenious, and has been applied to a few boats in our river; but the friction is very great in this method, so that it has not been adopted in the newest steam boats.

Another method has been devised by John Gladstone, an ingenious engineer of Castle Douglas in Galloway. The plan is detailed in the specification of his patent, obtained a few months ago: the principle of it is, to cause a number of vertical floats to sweep the water, by means of endless chains, which move round two moderate sized wheels, placed *fore and aft*. The chief advantage of Gladstone's plan seems to me to have been overlooked, even by engineers, who have inspected his models. I mean the curvature which his method allows the chains to assume. The bow wheel has *studs* on its periphery, which locks into the links of the chain. There are two chains on each pair of wheels, and the floats are attached by planches and screws to the links in a very firm manner. The stern wheels are mere *drums* to support one part of the chains, and keep them at the same degree of extension. The advantage of the curve formed by the chains is, that all the floats between the wheel and the central, or most depending part of the chain, act in part against a mass of water untouched by the contiguous floats: thus giving a larger surface to the water than if the chains had been strained tight between the wheels.

As far as I know, Gladstone's machinery has not been applied to any large vessel with a steam engine; but I witnessed a very fair comparative trial of this and common paddles applied to a small boat of about eighteen feet keel in the Queen's Dock at Liverpool. The diameter of the four wheels, three feet; they were mounted, first, with two endless chains each, and to each pair of chains thirty floats were screwed, at the distance of one foot between each float. The time in which the boat was impelled from one end of the dock to the other, a distance of four hundred and fifty yards, was noted by a watch; the chains were removed, and floats about the same size, or rather larger, were then screwed on the fore wheels, so as to resemble the usual paddles of a steam boat; and the time which the same number of persons required to impel the boat, for four hundred and fifty yards, was also noted.

Boat run 450 yards with Gladstone's chain paddles in 3 minutes 15 seconds.

- - - 450 - - - common paddles - - - 4 minutes.

With Gladstone's paddles it required only 442 turns of the shaft.

With the common paddles it required 492 - - - ditto.
Hence there is a less loss of power with the former by fifty-two turns.

We next applied a pair of the chains to one side of the boat, while the common paddles were on the other. As both were moved by the same shaft, the number of revolutions must have been the same: but Gladstone's chain paddles turned the boat round completely against the action of the other paddles, showing their decided superiority.

According to the account of the persons who turned the shaft, it was far easier to move Gladstone's paddles than the others; the latter communicated a disagreeable tremor to the hands, which was not perceived with Gladstone's chain paddles; and it was very obvious that the action of these impelled the boat far more steadily, and disturbed the water much less than the common paddles; the machinery too, contrary to my previous expectation, made less noise than the common paddles.

On these grounds, it appears to me highly desirable to try the effect of these chain paddles with a real steam engine, and in the broken water of the sea. The boat with chain paddles has been rowed about on our river, with good effect, even against a considerable current.

A vessel, so fitted up, cannot be boarded, when under way, except near the stern; and this seems to me the only practical objection; which, however, is of small importance, if the superiority in power turns out, on the large scale, what it promises from the above experiments.

8.—In what parts do engines most frequently get out of order or break?

The boilers in steam navigation, mostly from the mode of firing, and partly from the use of salt water, do not last long, and they require frequent *cleaning out*. This is now done by a blast of steam, more effectually and more quickly than by the old method. This should be often done to prevent the corrosion by the accumulation of salts in the boiler. The steam pipes are sometimes broken by the machinery, when the paddles strike the ground; but besides the usual tear and wear of the engine, the place most liable to give way is the crank of the paddle shaft. The ends of the floats are often broken also; these are often of wood, but often also of iron.

9.—Can you suggest any improvements in the present plan of building steam vessels, and constructing their engines, boilers and paddles?

My answers to this question are contained in the foregoing paragraphs.

10.—Can you suggest any plan for enabling a steam vessel to use sails, so as to be able to beat to windward, in case her engine should be out of order, at the same time offering but little impediment to her steaming power?

This question will be best answered by captains of steam vessels. One difficulty in a steam vessel beating to windward by sails alone, arises from the resistance which her paddles make to her progress, when not acted on by steam. It may be obviated by contriving a ready method of elevating the wheels, in such cases, out of the water; or perhaps better, by constructing the floats so that their edges might be turned to meet the water; in which case, there will be little impediment from the wheels. When this is accomplished, the use of *fore and aft sails* will enable a steam vessel to tack, almost like other vessels.

11.—In a gale of wind, with a heavy sea, what is the best method of managing a steam vessel?

This question can only be sufficiently answered by a seaman accustomed to steam navigation in the open sea. In general the paddles will have most power when the vessel is kept *head awind*; because then both paddles act equally on the water. On a lee shore, this, of course, would be the proper step. Well-constructed steam vessels will go through a very heavy sea without shipping much water; an instance of which I saw in the Robert Bruce, when overtaken by a heavy gale between Liverpool and the Isle of Man, where no sailing vessel could possibly have proceeded on the voyage, and where there would have been great risk, in such, to attempt returning amid our numerous sand banks. A steam vessel may be *laid-to*, under easy sail, if this should be necessary.

I have the honour to be, Sir, your most obedient humble servant,

Liverpool, 21, St. Anne-street,
May 14th, 1822.

Thomas Stewart Traill.

(22).—ANSWERS of Mr. Roger Fisher respecting Steam Navigation.

SIR,

Liverpool, May 1822.

IN reference to the queries respecting steam packets with which you have been pleased to honour me, I have to state, that I am not sufficiently acquainted with some of them to be able to give a proper answer, but to those with which I am acquainted, I shall feel great pleasure in communicating.

Query 1.—With what steam vessels are you acquainted; whether used in rivers, or in the open sea?

Answer.—We have two steam packets that go to Runcorn about sixteen miles up the river Mersey, one to Ellesmere port about ten miles up, two to Eastham about eight miles, one to Tranmere Ferry nearly opposite this town, three to Birkenhead Ferry opposite the town; in all nine, employed daily on the river. We have also one that goes from hence to Bagillt in Wales; this vessel goes in the morning and returns in the evening, and is found to answer extremely well, having run all the winter, a few stormy days excepted; after passing the entrance of the Mersey she is quite exposed to the open sea. We have another building here for the same purpose. We have three to Dublin, four to Greenock, and one to Whitehaven and Dumfries. There are four building in this port at present.

2.—By whom were they built, and by whom were the engines made?

They were built here with the exception of three at Greenock, and the engines made here.

3.—What is their respective tonnage, and what the respective power of their engines?

The tonnage of those employed on the river is from sixty to one hundred tons. Power of the engines from fourteen to twenty-two horses. The tonnage of those that go out to sea is from one hundred to four hundred tons; power of engines from twenty-two to one hundred horses.

4.—Have any of these vessels performed winter voyages at sea?

The Cambria to Bagillt has.

5.—Supposing the length of voyage to be twenty leagues from port to port, across a sea exposed to strong tides and heavy gales, how many vessels, in your opinion, would be necessary to be maintained, so that two should sail every morning, that is, one from each port throughout the whole year; except on days when a strong cutter of one hundred tons burthen would be obliged to put three reefs in her mainsail?

Three vessels.

6.—What description of vessel, as to tonnage, form, strength of building, masts and sails, in your opinion, is the best for sea navigation?

If sailing vessels, cutters from one hundred to one hundred and fifty tons; if steam vessels, from two hundred to three hundred tons.

There has been in my opinion a great improvement made in the strength of steam vessels built here lately; that is, by carrying the frame timbers up so as to form the projection of the sides, and then regularly planked up solid as any other part of the vessel, by which means

means they are much safer, and the loose projection which used to be added to the outside of the vessel, not required.

The form of the vessels ought not to be too sharp, for fear they should at any time get a-ground and heel so much as to take damage, or be destroyed.

7.—What description of engine, as to power, materials and general form and arrangement, and what description of boilers and paddles, in your opinion are the best?

I am not sufficiently acquainted with this subject; but I have observed that the first steam boats established were all short of power, and that the latter built ones go much quicker, having larger engines.

I am yours, most respectfully,

Roger Fisher, shipwright.

(23.)—LETTERS from *Mr. Napier*, respecting Steam Boats.

SIR,

Glasgow, May 10, 1822.

I TAKE the liberty of addressing you relative to a Report, which has just now been put into my hands of a Committee of the House of Commons, dated April 2d, of which you are Chairman. The evidence contained therein being erroneous, and does not at all convey to the Committee the information required; and as I am the maker of all the steam engines, with the exception of the *Tartar's*, denominated in the Report "*Scotch ones*," I trust you will readily excuse me for troubling you on the subject.

I beg leave to state, that I was the first that successfully established steam packets in the open sea from all the ports of England and Ireland they are at present plying from; as from Glasgow to Belfast; Dublin and Holyhead; Greenock and Liverpool; Dover and Calais; London and Leith. It is stated in the evidence, that the *Sovereign* and *Meteor* are the only boats that have plied or could ply during the winter. This is not the fact; for the *Eclipse*, which began to run about the same time with the *Sovereign* and *Meteor*, not only plied the whole of the last stormy winter between Glasgow and Belfast, without even once missing her hour of sailing from either side, but has sailed ever since she started without ever missing her hour, or any accident whatever occurring to her machinery; although she was, from the month of June to November, every day at sea, and four whole nights every week of that period; and the sea in that part of the Irish channel is fully as rough as anywhere, the tide running very rapidly, which is the cause of one place being more rough than another of equal exposure. She is not singular; the *Rob Roy* has plied these three successive winters, she is at present at Dover, and I understand none of the post-office packets there can sail with her in bad weather. The *Superb* is now plying the third year between Greenock and Liverpool, and not a single article of her machinery has ever given way, although she has been out in the worst of weather; it would tire your patience enumerating the whole, several others being similarly circumstanced. I can say with certainty, that the *Superb* and *Majestic* presently plying between Greenock and Liverpool are far superior in every respect to the *Sovereign* and *Meteor*, and will out sail them in any kind of weather; as a proof of this, the *Sovereign* was at Liverpool the other day, and sailed along with the *Superb*, when the latter outsailed the former fully one mile in five. I observe Captain Rogers states the *Ivanhoe* and *Talbot* to consume nearly double the actual quantity of coals they really do; this I do not think is a wilful mistake, he having too much of the English sailor in him to say any thing but the truth; but just gave it as he was told. The *Talbot* is at present here getting some repairs, and before she goes away I will ascertain that point to a nicety; and I would like much the person who gave that information was here to see them weighed and burned. The same cause that burned the *Robert Bruce* would burn the *Sovereign* and *Meteor*, or any other steam boat, that is, by keeping fire in the boiler when empty of water; one of the Holyhead boats I am informed has been on fire from this very cause. The whole drift of the evidence would appear to be to set forth Mr. Watt's engines; to which I could have had no objection had it been done with due regard to the actual truth, respecting the several packets whose engines I have made. The truth is, I have made nearly double the number of engines for boats going to sea that Mr. Watt has, and their machinery has not in a single instance been so far deranged as to prevent them from making their passage in a reasonable time, although some of them are of two and three years standing; and to the best of my knowledge, Mr. Watt has not made one but has had the misfortune of breaking down, although none of them is of more than one year's standing. I am sorry that I have been obliged to be so personal, but I do not see how I could avoid it.

I have only one request to make, that is, an opportunity of producing a boat in competition with Mr. Watt. If countenanced by Government, I will produce a boat that will sail between Howth and Holyhead in opposition to the best boat that is or will be there this season. Government will not be required to pay one penny for her until she has sailed the whole winter through, and not then, unless she has proved herself the best boat in all respects on the station. I beg it to be distinctly understood, that I do not make this request with a view to be employed by Government, but for the mere ends of justice. As a proof of what is herein stated, I will produce the most satisfactory evidence, if required; but for brevity's sake I refer to Henry Monteith, esq. member for the Lanark district of boroughs.

I am, Sir, your most obedient humble servant,

David Napier.

To Sir Henry Parnell, Bart. M. P.

Sir,

Glasgow, May 25, 1822.

I HAD the honour to receive your letter, dated the 14th instant, and would have replied to it sooner, had I not been every day expecting the Talbot finished with her repairs, that I could have inserted her exact consumpt of fuel; this I have not yet been able to accomplish, but will in a few days, when I will send it to you; it will be no guide to you regarding the comparative consumpt of fuel betwixt the Scotch engines and Mr. Watt's. I do not believe there are two of the Scotch boats of the same power that burn the same quantity of fuel, that being a point not paid the least attention to here, fuel being so cheap, not one of them can tell the exact quantity they consume, but merely by guess: there is still a greater difficulty in making that comparison; it is from the contents of the cylinder of the engine that the power is calculated, and I know to a certainty of boats, both on the Thames and the Clyde, the cylinders of which vary considerably in size, still the boats are called the same number of horses power, so arbitrary is that mode of christening them; in fact it is a matter of no moment, as any person at all versant with the business can easily make a boiler that will give the utmost effect to a given quantity of fuel.

Before answering the queries you have sent me, I beg leave to notice a little further the Report I took the liberty of finding fault with in my letter to you of 10th instant. All the improvements proposed to be introduced by the evidence of said Report, will be found in the Ivanhoe, (now in the possession of the post-office,) and every other steam vessel I have made to go to sea, viz. the proportion of the vessel, the breadth of paddles, placing the boiler and engine in the bottom of the vessel, and the introducing the water from the boiler to the sea through the side of the vessel.

Query 1.—With what steam vessels are you acquainted, whether used in rivers or in the open sea?

Answer.—The Rob Roy, Talbot, Waterloo, Robert Bruce, Ivanhoe, Superb, Belfast, Mountaineer, Majestic, Eclipse, City of Glasgow, and Rapid; all of these are used in the open sea.

2.—By whom were they built, and by whom were the engines made?

The engines of all of them, with the exception of the Waterloo, were made by me; hers, by Mr. Cook, of this town. The builders are, of the Rob Roy, William Denny, Dumbarton; Talbot, John Wood & Co. Port Glasgow; Waterloo, Robert Bruce, Ivanhoe, and Superb, John Scott & Sons, Greenock; Belfast, Ritchie, Belfast; Mountaineer, Cornwallis, Greenock; Majestic, John Scott & Sons, Greenock; Eclipse, Robert Steel, Greenock; City of Glasgow, Scott & Sons; Rapid, Cornwallis, Greenock.

3.—What is their respective tonnage, and what the respective power of the engines?

The Rob Roy is about ninety tons, thirty horses power; the Talbot, one hundred and fifty tons, sixty horse power; the Waterloo, two hundred tons, sixty horse power; the Robert Bruce, one hundred and fifty tons, sixty horse power; the Superb, two hundred and forty tons, seventy horses power; the Belfast, one hundred and ninety tons, seventy horses power; the Mountaineer, one hundred and ninety tons, seventy horses power; the Majestic, three hundred and fifty tons, one hundred horses power; the Eclipse, one hundred and forty tons, sixty horses power; the City of Glasgow, three hundred tons, one hundred horses power; the Rapid one hundred and forty tons, sixty horses power; the Ivanhoe, one hundred and seventy tons, sixty horses power; these measurements are inclusive of the engine room; some of them may not be quite exact, but are all within ten tons of the true measurement.

4.—Have any of these vessels performed winter voyages at sea?

The whole of them, except the City of Glasgow and Rapid; they being this year's production.

5.—Supposing the length of voyage to be twenty leagues from port to port, across a sea exposed to strong tides and heavy gales, how many vessels, in your opinion, would be necessary to be maintained, so that two should sail every morning, that is, one from each port throughout the whole year; except on days when a strong cutter, one hundred tons burthen, would be obliged to put three reefs in her mainsail?

I would consider three sufficient.

6.—What description of vessel, as to tonnage, form, strength of building, masts and sails, in your opinion is the best for sea navigation?

For the passage alluded to in the fifth query, I would suppose a vessel from one hundred and fifty to two hundred tons most suitable; of such a form as will give her most speed, and not be injurious to her seaworthiness; of such strength as will resist the shocks of the sea in the heaviest weathers without sustaining injury; no more masts and sails than will be necessary for such a vessel in a gale of wind without machinery.

7.—This is rather a difficult question to answer.

8.—In what parts do engines most frequently get out of order, or break?

There should no part go out of order or break; if there was a part more liable than another, that liability should be immediately removed.

9.—This is another question of some difficulty to answer.

10.—Can you suggest any plan for enabling a steam vessel to use sails so as to be able to beat to windward, in case her engine should be out of order, at the same time offering but little impediment to her steaming power?

This can be easily accomplished.

11.—In a gale of wind with a heavy sea, what is the best mode of managing a steam vessel?

Steer direct for the port intended, and if she does not make head way, try her to beat to windward with sails and machinery combined; failing both of them, a proper constructed steam vessel will lie-to like a duck.

I have the honour to be, Sir, your most obedient servant,

David Napier.

EXTRACT from a Third Letter from *Mr. David Napier*.

SIR,

Glasgow, June 4th, 1822.

I HAVE the honour of sending you the inclosed certificate of the *Talbot's* consumption of coals, on a trial made with her on Friday last, which I witnessed. I do not send this as a criterion of what the Scotch boats burn, but for the purpose of correcting the error in the Report I formerly had occasion to allude to. The above trial was made under unfavourable circumstances; the *Talbot* being the first steam vessel on the Holyhead station, and from want of experience of the people under whose charge she then was, the boiler was considerably injured, on which account, during the trial on Friday it leaked a great deal, which leakage had to be kept up by a continual supply of colder water, consequently a greater consumption of fuel than if the boiler had been tight.

The *Talbot* leaves Greenock to-morrow for London; when there, you will have a more convenient opportunity of sending some person on board to witness the correctness of the within certificate; and with good English coal, the consumption will be found to be considerably less.

David Napier.

"I this morning took on board the *Talbot*, at Glasgow, three tons twelve cwt. of common Scotch coal, and at 10 h. 49' A.M. left the former place; at the same moment commenced using the above coal; arrived at Greenock 1 P.M.; left Greenock at 1 h. 57' 30" and proceeded round the Cumbra Islands; returned to Greenock at 7 h. 15' 30", sailing in all a distance of 75 miles; the residue of the 72 cwt. of coal taken on board at Glasgow weighed 15 cwt. 2 qrs. 14 lbs. Including the time we remained burning coal at Greenock, before starting from that place, the exact consumpt was, during the trial, as near as possible 7 cwt. per hour. The *Talbot* has at present the same boilers and engines as she had in 1810, when first started, at which time I commanded her.

"Roger Langlands,
Lieutenant R. N."

"Greenock, 31st May 1822.

(24).—LETTER from *Mr. John Oldham*, respecting Steam Navigation.

SIR,

Dublin, May 29, 1822.

I WAS duly favoured with your letter accompanying a list of queries, and requesting my answers thereto; however, as it will place my observations in a more connected and condensed form, I take the liberty of submitting them in the following shape:—

To the greater number of the queries it is unnecessary for me to reply, as I can add very little to the information before the Committee, coming as it does from the first mechanical and nautical men in the kingdom. I shall therefore confine myself to such parts of the subject as have more particularly engaged my attention.

In the first place, I would observe, that as speed and safety are the two leading objects in steam navigation, steam packets can scarcely be made too strong, or their engines too powerful. In this latter, I am aware how I am opposed to many men of greater experience than myself; the result, however, of a few years, will, I am persuaded, prove my assertion to be correct. Since steam packets were first brought from the smooth water of rivers, to contend with the open sea, I have been strongly impressed with the idea, that the only part of the machinery of a steam boat, susceptible of serious and important improvement, was that part which is placed *outside* the vessel, and exposed to all the varieties of pressure and violence which an agitated sea presents.

The engine, as manufactured by Messrs. Boulton and Watt, is as nearly perfect, as perhaps it ever will be; the external common wheel, however, taking it with reference to the irregularities and violence of the fluctuating medium in which it moves, I consider as almost the worst possible means by which the power of the engine can be applied to the purpose of propelling a vessel; and, in the words of Professor Robison, speaking of the injudicious mode in which the power of the celebrated Marly engine is applied, "to be the struggle of ignorance with the unchangeable laws of nature."

That the common wheel, with *fixed* paddles, was so ill adapted for the application of the power of engines, to such a medium as water, so soon as it was put in a state of agitation, was familiar to every mechanical man of the least observation or experience; and perhaps there is scarcely one who has not anxiously, and many of them expensively, endeavoured to obviate this great impediment to steam navigation. Feeling, in common with them, the importance of this great desideratum, I went through a series of laborious and costly experiments, and have ultimately succeeded in bringing the action of the wheel to harmonize with the irregularities of the medium in which it acts.

The merit of the common wheel consists solely in its strength and its continuous action, and to these it is indebted for its existence as a mechanical agent in propelling vessels; these, however, are bad substitutes for good mechanical action, and a judicious application of power. My object was to supply the deficiencies of the wheel in the latter point, without any sacrifice of the former, and thus to qualify it to meet all the irregularities of immersion, violence, and velocity to which, in a heavy sea, it is momentarily and dreadfully exposed. This object I have accomplished by means of the revolving paddles, already successfully adopted on the *Waterloo*, a steam vessel belonging to Mr. Langtry, of Belfast, now plying between Liverpool and Dublin, on the *Aaron Manby*, an iron steam boat, at present plying between Havre-de-Grace and Paris, and now about to be introduced on other vessels in the Channel.

The difference between the effect of the common wheel and mine, with the revolving paddles, is this: the paddles of the old wheel being *fixed*, exactly in the same degree that the wheel is immersed, is the violence of its action increased, and the power of the engines misapplied; so that in a heavy sea, precisely at the moment when the power of the wheel is most required, and the ease of its action most essential to the safety of both vessel and engines, the contrary takes place, and at that moment the engines are least available and their action most disturbed. On the other hand, the revolving oars are prepared to enter the water smoothly, and with equal effect, at any given immersion, even up to axle deep.

The principle of these paddles, consists in causing them to revolve on their longitudinal or vertical axis, while at the same time they revolve round the horizontal axis of the wheel. By this combination, the continuous motion of the common wheel is preserved; and the paddles, instead of presenting their full surfaces to the water, enter it in an inclined direction and with a resistance gradually increasing and diminishing as the wheel revolves. The maximum resistance being found when the paddle is vertical, and the minimum when it is horizontal.

I do not think it necessary, for the purposes of the Committee, to go more at length into the construction of the revolving paddles, as they are already adopted and may be inspected on the vessels I have mentioned. I would merely observe further, that with these paddles, any extent of power which a vessel is enabled to carry, may be well and safely employed without jerk, straining, vibration, or violence of any kind.

There are many other advantages in the use of the revolving paddles which it is unnecessary here to mention; one, however, I think worthy of notice, namely, should the rudder of the vessel be carried away by any accident, she may be steered by means of these paddles, and her head brought about with the greatest ease and certainty.

I have the honour to be, Sir, your very obedient servant,
John Oldham.

(25.)—ANSWERS of Captain Robert Delap, respecting Steam Navigation.

Query 1.—I AM acquainted with most of the vessels now running in the Channel; and at present command the *Waterloo*, plying between Liverpool and Dublin.

2 & 3.—I cannot state the particulars of tonnage, &c. with sufficient accuracy.

4.—The *Waterloo*, although never running a winter through, has however experienced as severe weather, and hard gales, as any other steam packet, and was out in the last bad gale in the Channel.

5.—I consider three vessels sufficient for the purpose.

6.—I am not sufficiently acquainted with steam engines to give any satisfactory answer to this query.

7.—The engines of the *Waterloo*, compared with others, appear very much encumbered and heavy; besides, the motion does not go directly from the engine to the paddle wheel, but passes through two pair of cog wheels on each side, and is what is called on the third motion, so that a great portion of the power is wasted.

8.—Whenever the wheels encounter any of those severe jerks which are felt in falling suddenly in a heavy sea, the engine is very likely to go in the weakest part, this has several times occurred to the *Waterloo*, before she got her new paddles, though she is many times stronger than any engine I ever saw.

9.—I cannot suggest any alteration in the engines or boilers; but I strongly recommend the new revolving paddles invented by Mr. Oldham of the Bank of Ireland. Formerly, with the old wheels, the *Waterloo* went as uneasy in rough weather, and shook as much as any other steam vessel, and when the engine was brought up in a heavy sea, she strained as badly as any other: since she has been fitted with Mr. Oldham's paddles, there has been no shaking or jolting whatever, even when working in the heaviest sea. Since I have got the new paddles, I have crossed the Channel between Dublin and Liverpool sixteen times, and was out in the very bad gale about ten days back, during which time I have had no trouble with them, but they rather appear to improve every trip. Comparing her speed with what it was formerly, there is a considerable increase, and all she wants is more power, to make her go as fast as the best. Her paddles now throw up no back water, and which I consider a great saving of power.

This invention, besides what I have already stated, has many advantages over the old wheels; by it, I can bring the head of the vessel round in a much shorter space, and on coming to, in a tide way, I place the paddles edge-wise to the stream, by which all danger of dragging the anchor and drifting is avoided. Besides, passengers are not annoyed with the shaking and vibration, which is so much complained of in other steam vessels.

10.—I conceive, with common wheels, it is impossible for steam vessels, as now rigged, to beat off a lee shore; I am, however, of opinion, that when they get the revolving paddles, they may be rigged, so as to enable them to beat to windward without difficulty.

11.—If the vessel is able to make headway, I recommend steering even head to wind; but, if not, she must be steered as close to the wind as possible.

These answers should have been sent earlier; but that I am only just now returned from Liverpool.

Dublin, May 29, 1822.

Robert Delap,
Commander of the *Waterloo*.

(26).—ANSWERS of Mr. Jacob Perkins, respecting Steam Engines.

SIR,

ANNEXED I have the honour of submitting answers, as clear and explicit as the shortness of the time would permit, to the several queries you did me the honour to propose to me,

Your most obedient humble servant,

No. 69, Fleet-street, London.

Jacob Perkins.

Answer 1.—It is only with the American steam vessels that I have had an opportunity of being acquainted. Of those used in rivers I have the best knowledge, having never taken a voyage in an open sea vessel; but have frequently seen them.

3.—The tonnage of the American steam vessels varies from 100 to 700 tons; and their steam power from 10 to 100 horse.

4.—A steam ship plies between New York, the Havannah and New Orleans, at all seasons of the year; she has made many winter voyages without the least accident; she has been also in many storms, and has the character of "making better weather" than any other description of vessel. She is spoken of by her passengers in the highest terms, and by many she is preferred to the packets, not only from the certainty of making shorter voyages, but on account of greater safety; this vessel is about 700 tons burthen, with an engine of 100 horse power.

5.—I do not feel capable of answering.

6.—The description of steam vessels, which have been found to answer well in America for navigating the ocean, have had their hulls formed the same as vessels of other descriptions which are best calculated for sailing; they are built of about the same strength as common, with three masts of two-thirds the usual length, and from 300 to 700 tons burthen.

7.—The engines are both *high* and *low* pressure. The high pressure when properly constructed are much preferred, for the following important reasons; viz.

Their perfect safety; their economy in fuel (causing a saving of at least two-fifths) being little more than half the weight of condensing engines; they cost about half as much; are less liable to get out of order, and require much less water for the boiler. The common paddle-wheel of about 20 feet diameter is much preferable to any of the great variety of substitutes which have been tried and abandoned. Paddle-wheels, when properly constructed, certainly appear to apply the power of the engine in a more direct line to that of the way of vessel, and at the same time with a more equal velocity, than any other of the numerous applications hitherto invented. Paddles working at any other angle than that of a right angle with the surface of the water, and that of any other line than a right line with the boat, lose power; and that in proportion to their deviation from that line or angle. Great power is lost also when paddles are constantly changing their velocities. The larger the wheels the more horizontal motion is produced, and less loss of power by the dip of the paddles, and when leaving the water; occasioned by their necessary deviation from the best angle.

An engineer of one of the quickest American boats (which now moves through still water at the rate of 11 miles per hour) observing the tail water to move with great velocity along the sides of the after-part of the vessel, thereby increasing the friction, was induced to alter the paddles from a right line with the shaft to that of about five degrees from it, the result was that much speed was lost, which was only restored by replacing them in their former situation. Many other modifications of the common wheel have been tried; among the most plausible was that of making the paddles, by an ingenious mechanical contrivance, to enter and leave the water perpendicularly to its surface: when tried it was found that although the wheels for which they were substituted were in other respects the same, the boat would not move as before, and the original wheels were again used. The loss was undoubtedly occasioned by the diminished velocity of the paddles when entering and leaving the water.

High pressure engines, built on Oliver Evans's plan, are known to be *perfectly safe*, owing to their peculiar construction.

The boiler, which is considered to be the only dangerous part of a steam engine, when made on Oliver Evans's system, never explodes. This boiler consists of a cylinder made of wrought sheet iron of $\frac{1}{2}$ of an inch in thickness, its diameter is 30 inches, and its length 18 feet. The boiler is now invariably of the above mentioned dimensions, being found by long practice to be the best. For a 100 horse power engine, three and sometimes four boilers are used: as the power of the engine is increased the boilers are increased in number, but not in size. At each end of the cylinder a disk of cast iron, of four inches in thickness, is so firmly secured, that the wrought iron part of the boiler would give way with a quarter part of the power necessary to explode the cast iron ends. When the boiler gives way, which must necessarily be the case sooner or later, it will be at the weakest part. The rend or opening, which takes place when the boiler gives way to relieve itself, discharges no more steam than is usual for the safety valve to emit, of course no scalding effect is produced. It is now well known that the higher the temperature of the steam is raised, the lower is its temperature when it issues from the rend or valve. I have frequently held my hand within six inches of the steam cock, when the steam has been up to 300 lbs. to the inch, and when it required all my strength to keep it in that situation, without experiencing the least sensation of heat.

An account of upwards of 600 of these rends have been recorded, without the slightest injurious effect having been produced. This engine appears to want nothing to perfect it but the application of the very ingenious and valuable flexible metallic piston, invented by Mr. Field. This invention (the metallic piston) is of the utmost importance in furthering the improvement of high pressure engines. Since high steam is capable of being kept under perfect control, there seems no reason why the power may not be doubled or even further increased, thereby diminishing the weight in the same ratio.

It must be acknowledged that many dreadful accidents have happened in America from the explosion of high steam boilers, but they were wholly owing to a want of knowing the true form of such boilers. As it has been repeatedly reported in America, that some of Evans's boilers had exploded and caused great destruction, I think it proper to state what sort of boilers they were that did explode. Some of them have been made in every respect like Evans's, excepting that they had the addition of a cylindrical flue of about 12 inch. diam. running through their centres, for the purpose of admitting the fire through them after having passed under the cylinder; the effect of which was, that when the water from neglect or otherwise got below the flue, the flue became sufficiently heated for the great pressure of the steam, to collapse the inner cylinder or flue, and draw it from the end of the boiler, leaving an orifice of proper size to convert the boiler into a steam rocket of sufficient power to move off horizontally through the cabin, sweeping every thing before it.

There are about 300 steam vessels now in use in America, half of which are high pressure of different degrees, say from 20 to 150 lbs. to the inch.

8.—The high pressure engines in their improved state very seldom get out of order, and when they do, it is principally from the connecting bars or rods giving way. The boilers (when from long use they give way) are readily repaired in the following simple and easy manner: After the boiler is cooled down (which is much sooner done than the large condensing engine boilers are) a workman enters the main hole with a patch of lead (which is always kept ready for the purpose) and secures it immediately over the rend with a wooden brace. The pressure of the steam will close this patch of lead, and make the boiler as tight as before. I have known this temporary remedy stand for months.

9 & 10.—I cannot suggest any improvement further than I have before stated in answer to the 7th query; excepting that of adopting some method for preventing the water rising up the wheel, occasioned by the rolling of the vessel or the swell of the sea, which not only at times very much retards the wheels, but strains the whole machinery. This, I think, may be done by having the wheels run in an air-tight case; I mean air-tight above where the wheel enters the water: the effect would be, that the rising of the water in the wheel case would condense the air sufficiently to prevent the water from rising high enough to produce the injurious and disagreeable effects occasioned by the paddles (which is sometimes the case) entering the water parallel with the surface.

11.—In this I have had no experience.

Appendix, No. 9.

EVIDENCE given by *Mr. Brunton*, before Committee on Steam Engines and Furnaces, Sess. 1820.

Mr. William Brunton, called in; and Examined.

WHERE do you live?—I reside in Birmingham, at the Eagle Foundry.

What is your general employ?—That of a civil engineer.

Have you turned your mind to the extinction of smoke in furnaces?—Yes, I have.

What progress have you made in the attempt to reduce the quantity of smoke emitted from furnaces?—Since I had the honour of giving my evidence at the last Select Committee, I have erected eight fire regulators, all of which have given the greatest satisfaction as regards burning the smoke, one of which I erected at Whitechapel distillery, and another I erected at Liverpool, and they have uniformly effected a saving of coal, which on the average is more than 30 per cent. They were applied to boilers which were originally erected by Messrs. Boulton and Watt, and justly considered upon the best construction of the common furnace. I beg that the Committee would be pleased to examine Mr. James Scott Smith, of the house of Liptrap and Smith, Whitechapel, and also Mr. Branker, sen. from Liverpool, who has come thus far unsolicited by me, and quite unexpectedly, to give evidence to the same facts.

What quantity of coal per hour can you burn with a *maximum* effect in your furnace, upon your grates, and at the same time consume the smoke?—This considerably depends upon the nature of the coal. In London, upon a grate of five feet diameter, we consume three bushels per hour; in Staffordshire and Lancashire, about three hundred weight. In general we burn with *maximum* effect more than can be burned upon a grate constructed in the usual manner, yet completely remove the nuisance of smoke, and this under the same sized boiler. The reason of this will appear, by considering that boilers are usually constructed large enough to receive the effect of the fire when it is in excess, which is the case between the intervals of putting coal upon the fire. With the fire-regulator we have no excess, but a uniformity of heat, which may with propriety be maintained above the mean temperature of

of the common furnace. And here I beg leave to remark, that this uniformity of temperature we are enabled to maintain displays by contrast many striking proofs of the injurious effects of heat in the common furnace above alluded to. First, by the fire-regulator we have much less scoria or clinker from the same quantity of coal, and that is formed in thin lamina upon the grate, so as to form a sort of coating to the bars, and prevents them from being ever heated to redness; and in general, while three bushels of coals per hour are consuming upon the grate, the bars are seldom so hot as to discolour writing paper, when pressed against them. Secondly, another effect, of considerable importance in London, is, that the fire-bricks which form a part of the fire-place are not even vitrified, and will therefore last very much longer than in the usual furnace. Thirdly, the boilers, in consequence of the regularity of the heat, may fairly be expected to last much longer, and the supplementary boiler, on which of course the greatest wear takes place, may at any time be taken down, while the principal boiler, with all its connecting pipes, remains unmoved.

What are the circumstances peculiar to the fire-regulator to which the saving of coal, in your opinion, is to be attributed?—First, by the very equal distribution of the coal upon the surface of the grate, maintaining a thin fire and a sharp draught; this is effected by the coal being introduced in small quantities, falling upon the whole of the area of the fire in regular succession: Secondly, to the coal being introduced upon the fire without opening the fire-door; this is effected by dropping the coal through the roof of the supplementary boiler: Thirdly, to the decomposition of the coal, being much more perfect than by the common furnace; effected by the revolving of the grate, and thereby exposing each side of every piece of coal on the grate to the current of the fire passing constantly in one direction across the grate, I mean across its diameter: Fourthly, to the introduction of the coal, being completely governed by the steam generated; analogous to a water-wheel, governing by its velocity the quantity of the water permitted to fall upon it; thus, considering the production of the steam as the effect, and the introduction of coal as the cause, the former has a perfect check over the latter, and at no time admits more coal into combustion than is really necessary for the performance of the work which the engine is then doing: Fifthly, to the whole apparatus being a very simple mechanical arrangement, acting independently of either the skill or the carelessness of the fireman.

Is it not necessary to break the coals into small pieces before they are put into the hopper?—No coals should be put upon a steam engine fire until they are small enough to pass a three-inch mesh; therefore, the necessity of breaking the coal to that size is advantageous; but we have lately burned a species of small coal in our own furnace, and also in the town of Birmingham, which has till now been regarded as perfectly useless; and as such there are thousands of tons encumbering the ground in the Staffordshire collieries, incapable of being used with effect in any other furnace than the fire regulator; and we have produced with this hitherto supposed rubbish, 70 per cent of the effect of saleable coal; thus bringing into use that which was of no value.

When you have obtained the maximum effect of the coal, have you had a thick fire and slow draught, or a thin fire with a sharp draught?—Decidedly the latter; and it is my opinion that the greater quantity of oxygen we bring into contact with the coal in combustion, the greater heat or effect we shall produce from it; and I consider the damper, though useful in its proper application, yet when constantly used, to be an imperfect attempt to save at least part of an excess of coal injudiciously thrown upon the fire, and thus devoted to destruction; in short, to use an illustration, I regard the damper as I would an extinguishing engine standing ready before a house to extinguish the flames when it takes fire; whilst I consider it to be a much wiser plan to use such means as will effectually prevent the conflagration; that is my idea of a damper. In all this I am borne out by the current experience of the Cornish engineers, who, profiting by the counsel and recommendation of an honourable and scientific member of this Committee, Mr. Davies Gilbert, have generally adopted a thin fire and a quick draught; and the monthly report of the performance of the engines in that district bear ample testimony of the propriety of the measure.

Is not your apparatus more expensive than the plans which others have adopted to burn the smoke; and will that expense be repaid by its advantages?—The fire-regulator, and the other modes proposed for burning smoke, stand upon very different grounds; for the value of a boiler, as an implement for generating steam, depends upon the quantity of coal which may be burned under it producing a *maximum* effect; and when any change is made in a furnace, by which either the quantity of coal consumed with a *maximum* effect is diminished, or the effect of the same quantity of coal is decreased, in either case it is injurious and expensive; the former is injurious as it relates to the boiler, because either a larger or an additional boiler will be necessary; the latter, as relates to the coal, because a greater quantity must be required to do the same work: I venture to affirm, generally, that where well-constructed furnaces have been altered, in order to consume the smoke, one or other of these effects have been produced; on the contrary, the fire-regulator, while it increases the quantity of coal consumed, increases the effect also, and thereby increases the value of the boiler to which it is attached, as it will raise a greater quantity of steam at much less expense. The usual plan adopted consists of a mere change in the form of the furnace, which, when appreciated by the proprietors, is of no more value than it was before; but the fire-regulator makes a positive addition to the size of the boiler, and is tangible property, and when the proprietor takes his stock stands for its own cost.

Is what you say respecting the common furnace the result of practice, or merely of observation?—The greater part of my active life has been spent in the employ of Messrs. Boulton and Watt; first, as an operative servant, and for many years as the superintendent of their manufactory, during which time I had a good deal of experience in this subject; the

the drawing I now present is of a furnace erected by me at Nottingham ten years since, which burnt the smoke as well, and perhaps with as little loss, as any other I have seen; it is at the service of the Committee [*delivering in a drawing*]; it has no reference to my present plan of burning smoke, and there is nothing particular in its construction further than the air is made to pass through chambers of brick-work, and brought into contact with the flame by means of holes in the bridge-wall, through which the air is permitted to come in contact with the smoke.

Mr. William Branton, again called in; and examined.

WHAT may be the general expense of altering an old furnace for the purpose of applying your apparatus, so as to make it effectual to a twenty-horse engine?—I conceive that the expense would be about three hundred pounds; but I would observe, that in London the apparatus would be paid for from the savings of not more than eighteen months, and in Staffordshire, at the most, three years.

Does that sum of 300*l.* you have stated include remuneration to the patentee, and every other particular?—Yes; I would add, that this apparatus includes the advantages of every other mode of burning smoke, combined with a saving of coal, arising from the practicability of having a thin fire and a quick draught, which in the usual mode cannot be attained.

Do you mean to state, that though the smoke may not be entirely consumed, or so well consumed, as by some other apparatus, yet that disadvantage would be counterbalanced by the saving of coal effected by the use of your machine?—No; I mean to say, we burn our smoke as completely as any other; and at the same time, we have the additional advantage of burning the coal more perfectly over a quick draught, which is decidedly an improvement.

You say that there is no invention by which smoke can be more effectually consumed than by your apparatus?—Yes, that is what I say; but I consider economy as an additional advantage.

Do you mean to include all expenses whatever, when you say the expense for putting up your apparatus is three hundred pounds; would it include the carriage of materials, and every thing?—Very likely that is different in different parts of the kingdom; in some places our brick-work costs next to nothing to what it does in London, and other things in the same ratio. Sometimes we have a good deal to pay for carriage, and sometimes we have little or none to pay, but in general, when speaking upon that subject, I rely that the thing in London will pay for itself by the saving of fuel in eighteen months in general.

What part of the expense of the three hundred pounds do you consider as a remuneration to the patentee?—About sixty or seventy pounds.

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S I X T H
R E P O R T

OF THE
SELECT COMMITTEE

ON THE
R O A D S

FROM LONDON TO HOLYHEAD;

AND

Into the Regulations for Conveying His Majesty's Mail
between Dublin and the Interior of Ireland.

IRISH ROADS,
&c.

*Ordered, by The House of Commons, to be Printed,
4 July 1822.*

THE REPORT - - - - - p. 3.

MINUTES OF EVIDENCE - - - - - p. 7.

SIXTH REPORT.

THE SELECT COMMITTEE appointed to inquire into the state of the Roads from *London* to *Holyhead*, and from *Chester* to *Holyhead*; into the regulations for conveying His Majesty's Mail between *London* and *Dublin*, and between the Northern Parts of *England* and *Dublin*, and between *Dublin* and the interior of *Ireland*, and into the state of the Mail Coach Roads in *Ireland*; and to report their Observations thereupon, together with the MINUTES of the EVIDENCE taken before them, from time to time, to the House; — HAVE agreed to the following REPORT.

YOUR Committee have inquired into the manner of conveying His Majesty's Mails between *Dublin* and the interior of *Ireland*, and into the state of the Mail Coach Roads in *Ireland*.

By the Act of the 45th Geo. III, c. 43, "to amend the Laws for improving and keeping in repair the Post Roads in *Ireland*, and for rendering the conveyance of Letters, by His Majesty's Post Office, more secure and expeditious," the Postmasters General of *Ireland* were required to have surveys made of all the Mail Coach Roads, with Plans and Estimates for the improvement of them; they were also required to lay these Plans before the different County Grand Juries, where the Roads were County Roads, and before the Trustees of Turnpike Roads, where the Roads were vested in Trustees. The Act also enabled the Government to make such advances of money to the Grand Juries and to the Trustees, as were necessary for executing the proposed improvements.

It appears from the documents which have been laid before Your Committee, that Surveys have been made of 2,068 miles of Mail Road; that the Estimates for improving this extent of Road, amount to 1,934,782*l.*; and that the sum of 673,516*l.* has been presented and applied by the Grand Juries, from time to time since 1815, in improving old and making new Mail Roads.

Notwithstanding this great expenditure, the evidence which has been given before Your Committee, and the documents already referred to, fully prove that the Mail Roads of *Ireland* are, in many instances, in a very bad state: although the new lines of Road appear to have been laid out in a scientific manner, the execution of the work has frequently been defective, and in some cases must have been accompanied with great dishonesty.

It appears to Your Committee, that the advantages promised by the Act of 1815, have not been fully brought into operation, in consequence of a subsequent law passed in 1816.

They are now disposed to recommend the appointment of a Board of Commissioners, upon the precedents of the Highland Road and Holyhead Road Commissioners, as the best plan for superintending the Irish Mail Coach Roads: the Commissioners to be named by Parliament; not to have

513. any

MINUTES OF EVIDENCE

- p. 7.

APPENDIX; viz.

- No. 1.—SURVEYS AND RE-SURVEYS of Roads under Warrants of the Postmaster General; with a Statement of the Amount of the Estimates for improving the several Lines of Post Roads in Ireland; also, an Account of the Expense incurred in making Surveys and Re-surveys, and of Salaries or other Payments to Surveyors, under the Acts 45 & 46 Geo. III.; together with a Return of the Number of Mail Coaches in Ireland - pp. 45—87.
- (N° 1.)—Surveys under Warrants of the Postmasters General - pp. 45—47.
- (N° 2.)—Re-surveys made at the request of Grand Juries or Trustees - pp. 48—59.
- (N° 3.)—Re-surveys by order of the Lord Lieutenant - p. 53.
- (N° 4.)—Abstracts of Estimates furnished to Grand Juries - p. 56.
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Sabbati, 20^a die Aprilis, 1822.

SIR HENRY PARNELL, BARONET.

IN THE CHAIR.

William Bourne, Esq. Called in; and Examined.

WHAT mail coaches do you contract for in Ireland?—The coach from Dublin to Limerick, and from Limerick to Ennis; I have also contracted for the coach from Limerick to Tralee, but the road is not in a state for the coach to Tralee; it has been for a long time in repair.

In what state are the roads upon which your coaches run?—The road from Dublin to Limerick is extremely good; it is not to be surpassed in Ireland; I believe there is no better.

Who have the management of it as far as Naas?—Captain Taylor and Major Taylor.

On what conditions do they manage that road?—The tolls, by the 13th of the King, were assigned to them for a period of fifty years.

Do they share the tolls as private property, after keeping the road in repair?—Whatever surplus tolls there are, they share.

Have you the road from Naas to Limerick on similar conditions?—Yes. When the mail coach was established, in the year 1791, the road was next to impassable. I was induced to undertake a contract for the road, in consequence of a promise from the gentlemen of the country to put the road into proper repair. From circumstances I am not competent to explain, there was not any thing done to the road, and Mr. Anderson and I were obliged to lend 2,000 *l.* to the trustees of part of the road to make it passable; in a very short time it became again in so bad a state, that it was found necessary either to relinquish the business in which we had embarked, together with the sum we had lent, or to undertake it on an extended scale; and we proposed to lend to the trustees 27,000 *l.* for the purpose of putting the road into perfect repair, upon our receiving security for the payment of the money; and, in the event of their not being competent to do so, we contracted, under a penalty of 20,000 *l.* to put the road into repair, and to keep it in repair, on the tolls being assigned to us for thirty years: in a very short time we put the road, by a very considerable advance of our money, into perfect repair. I subsequently got Mr. Anderson's share of the road, and have kept it, I think, in perfect repair ever since. I have various testimonials of high approval of the state in which the road has been kept.

You have an act of parliament, have you not?—Yes; by the act which vested the tolls of the road from Dublin to Naas in Messrs. Taylor. The tenure of the road from Naas to Limerick was extended during the same period, in consideration of the improvements which had been effected on the Limerick road by Mr. Anderson and myself; the tenure which was originally granted to us was extended for the same period as on the road from Dublin to Naas.

You share any surplus profits, after keeping the road in repair, as private property, under that act?—Yes, if there is any; but in several instances there has been no

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S MINUTES OF EVIDENCE BEFORE SELECT COMMITTEE

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surplus; I should conceive, if there was a surplus, I should have a very fair claim to it; and I believe there is no person who would not conceive me entitled to it: it was a desperate speculation, and one forced upon us by the state of the road.

You were principally induced to undertake this road, in consequence of having previously undertaken a contract for the mail coaches?—Yes; from the absolute necessity of some exertion being made to enable us to carry on the coach business.

In case of the road coming out of repair under your management, what remedy has the public to secure its being restored to a proper condition?—One commissioner may convene a meeting upon the first Tuesday in any month; and if a majority of three out of four of the commissioners at such meeting shall be of opinion that the road is in bad order, an application may be made to the Lord Chancellor; and he may, upon proof that it is in bad order, not only sequester the tolls, but enforce the penalty of 20,000*l.* for the purpose of putting the road in repair, and appoint such persons to direct the road as he may think proper.

In mentioning the commissioners, what commissioners are there belonging to the Limerick road?—There were a number of commissioners originally appointed by the act; some for each and every district of the road, others for each of the three districts or divisions.

The road is divided into three districts?—Yes; one from Naas to Maryborough, the next from Maryborough to Roscrea, and from thence to Limerick.

Have you the complete power over the receipt and application of the tolls, independently of the commissioners?—Yes; the object of the commissioners is with a view to protect the public interest, by a control over Mr. Anderson and myself.

Have you a power of fixing turnpike gates?—No; I cannot fix any gate without permission from the commissioners.

Are the tolls limited by the act?—Yes; there are certain divisions within which there can be but one payment: the commissioners have the power, on our application, to alter the situations of gates, and to erect such other gates as circumstances may render necessary; there are numerous new roads made, which rendered it expedient for some alterations to take place.

What is the rate of toll paid on the road?—A shilling English for a carriage and two horses, and two shillings English for a carriage with four horses.

How much on carts?—Three-halfpence for a car with a wheel of three inches bearing, turning on the axle; a greater toll upon drays; a toll of sixpence halfpenny upon drays; but any car of the description I have mentioned, is liable to a toll only of three-halfpence.

What was the toll on a stage coach with four horses under the original act?—*2s. 2d.*

How many passengers could go by a coach?—Six persons inside and three persons outside: there was a clause in that act which made any carriage, taking a greater number of passengers, liable to a toll of 5*s.* in addition for each horse drawing such carriage.

What was the reason of this additional toll?—Mr. Anderson and I were informed that the canal company were about to establish a coach to take thirty-six passengers; and feeling the impossibility of contending with so powerful a body, directing such a carriage, we declined to have any connection with the road unless this clause was introduced for our protection.

Was not this clause repealed by a subsequent act?—It was; this clause was made a model of other acts, where the same circumstances did not exist, and where it was conceived to be oppressive; as for example on the Naas road, where there was no canal coach to act against it; the canal coach was from the Canal Harbour from Monasterevan to Limerick, but it was introduced into the act from Dublin to Naas, and from Dublin to Mullingar, and I believe in other instances where such opposition could not possibly exist; and upon these grounds, it being then deemed oppressive, it was generally repealed by an act called Mr. Cooper's act.

This act has again been altered?—That act being considered to be an infringement on vested rights, was repealed by an act brought in by the present Lord Maryborough; but after this another act was passed, imposing in lieu of the 5*s.* additional toll upon a particular description of carriage, giving a toll of 4*d.* upon every horse drawing every description of public carriage.

So that the toll now on a stage coach is 2*s. 2d.* and 4*d.* a horse?—Yes.

What do the caravans pay?—A caravan, drawn by two or three horses, is liable to the original toll of 1*s. 1d.* and an additional toll of 4*d.* per horse.

Are there any parts of the Limerick road in any degree unsafe for night-travelling,

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in consequence of large ditches on the sides of it?—A considerable part of it is so, particularly through the county of Kildare.

Do you consider yourself, as contractor for keeping that road in repair for the public, bound to fill up those ditches?—No; the law expressly states, that within two years after ditches shall be filled by presentment, and the bridges built or repaired. Mr. Anderson and I shall put the road into repair. I therefore consider that my duty is conditional; and that I was not bound to do what I have done, if I was not actuated by a sense of public duty, and by my individual interest, until the grand juries have filled the ditches, and widened and repaired the bridges. The law expressly says, that the compensation to the landowners, and the filling of the ditches, shall be done by presentment.

Has not this been the construction put upon the act by the grand jury of Queen's county?—The grand jury of Queen's county most liberally contributed every thing which was asked for the safety of the public.

To what extent did that go; the ditches which were filled up by presentment?—I cannot state the extent; but they granted every thing which was asked, from the bounds of the county of Kildare to the King's county, and to Tipperary, from near Monasterevan, to near Roscrea.

That is upwards of twenty-five miles, is it not?—It is about twenty-five miles.

Have you applied to the grand jury of the county of Kildare, to have the ditches filled up along the road passing through that county?—Yes; I have made two applications. I should have been discouraged from the ill effect of my first representations, but that individuals generally on the grand jury desired me to renew my applications, for those things that were conceived to be most necessary.

Does not a part of the road cross the King's county, leaving the county of Kildare at each extremity?—Yes.

Have the grand jury of the King's county granted money for filling up the ditches?—They have: it is about half a mile distance; but so far as the King's county is in that tract surrounded by Kildare, they granted the money for filling up the ditches.

Do not the mail coaches travel in the night through the county of Kildare?—The journey in winter is performed, both up and down, in the dark; and the road is so narrow, that it is impossible for two carriages of any description to pass: two cars could not pass each other with safety.

How are the bridges upon this line over the streams which cross it; are they sufficiently wide for the road?—They are very narrow; in some instances entirely unfenced, and generally directed, not to the road, but to the watercourse over which they pass.

Is not a good deal of this road very low land, and subject to heavy fogs?—A great deal of it is, for a considerable distance, covered with water.

Have accidents happened upon this part of the road in consequence of the ditches?—Several accidents have happened in consequence of the ditches and the bridges.

Between Roscrea and Limerick, are the ditches filled?—The county of Tipperary presented very generally; there are scarcely any ditches between Roscrea and Limerick; a great deal of that road is new road, that is made, several miles of it, very spacious, and in every instance the ditches at the sides of the road filled up.

Are you acquainted with other mail coach roads in Ireland?—I have some knowledge of several of them.

Is not your brother a contractor?—Yes, he is a contractor for the mail coaches to Galway, Sligo, Westport and Castlereagh.

Do you think the provisions of the Irish laws are sufficient to secure mail coach roads being kept in constant repair when they are under the management of the grand juries in the different counties?—I do not know how to answer that question.

What security has the public in case of a road being very much out of repair, that is under the management of the grand jury for the county in which it lies, of having that road put into proper repair, to make it safe for mail coaches to travel upon it?—There is not any security whatever; and I conceive it must tend to the safety of the intercourse, that there should be a power either to enforce on grand juries the effectuating public safety; either the Lord Lieutenant or the Postmaster General should have the power, in case of the grand jury not doing that which is necessary, to order it to be done.

Do you mean, that they should be repaid the expense by the counties?—

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That the Lord Lieutenant should be permitted to advance the money for all such repairs, and that it should be repaid by successive levies presented at once, in the same manner as other money is levied under the forty-fifth of the King, to be presented at once, and raised at successive collections.

Do all the public coaches pay the additional toll of four pence a horse?—No, the mail coaches do not pay the toll; and I conceive that the post office most improperly withhold it.

Is this additional toll of four pence charged on any other road but the Naas and the Limerick?—I believe it is on all the roads which have the same clause respecting the extra passengers.

You have stage coaches between Limerick and Dublin, not being mails?—Yes.

In going from Naas to Dublin, do those coaches go along the direct road which is under the management of Mr. Taylor, or by any other road?—They go a presentment road, on which there is but one payment of 2s. 2d. instead of paying, upon this road, 5s. 8d.

What is the distance between Naas and Dublin by Mr. Taylor's road?—Fifteen miles.

What is the distance by the road you go?—I dare say it is eighteen.

What is the rate at which the Limerick mail goes between Dublin and Limerick, according to your last arrangement with the post-office?—We perform the journey in fifteen hours; and the stops out of that are about an hour and a half; an hour and forty-two minutes is that allowed.

What is the distance?—One hundred and twenty English miles: something more than ninety-four Irish.

What stops are they; for the post-office business?—For post-office business, and the necessary stops for changing horses. In consequence of this acceleration, which is a matter of experiment, and depends on circumstances, we have got five new stages, at a very heavy expense, and our continuing will depend upon circumstances that are now at issue.

You mean that you change horses five times more frequently than you used to do?—We change horses four times more than we used to do; we have five new stages more than we used to have; for one of those I pay nearly 100*l.* a year for the place itself, in addition to agents and helpers.

What is the usual time the mail stops at the post-office, merely for delivering and taking up a bag?—That is dependent upon the circumstances; there are some cases where twelve minutes are allowed, at Monrath, being a post-office; there are other stops. I think five minutes are allowed at Nenagh.

Where there is no other business but to deliver and take up the bag, what time is the coach generally detained?—The stops are, at Rathcoole eight minutes; at Naas eight minutes; at Ballymenagh, which is a new stage, where there is no post-office business, eleven minutes; Monasterevan twelve minutes; Emo three minutes; we do not change there; at Kilminchy nine minutes; we change there; there is no post-office there; Maryborough post-office three minutes; Monrath thirteen minutes; Killmartin three minutes; that is one of the new stages; Duncannon two minutes; no post-office; Toomavara four minutes; no post-office; Nenagh eight minutes; Kilmustello eight minutes; Sallymount, another of the new stages, four minutes.

What weights are commonly drawn by the carriers, and in what description of carts or carriages on the Limerick road?—Some of the carriers horses, those in Roscrea in particular, are in the habit of taking thirty-two hundred weight: Mr. Fawcett, of Roscrea, told me that he had just got down by two carriers cars four hogsheads of sugar, each hogshead weighing sixteen hundred weight.

What sort of carriage do they make use of?—What is called a Scotch dray car; they are very long, but the wheels are very narrow: there is no instance, I believe, in which the wheels are three inches broad, in some not more than two; and from the immense weight and the slowness of the motion they work into the road.

Is this a customary loading, or is it only accidental?—It is the general loading of the carriers cars.

Do they travel in great numbers upon the road?—Yes; in general about eight or ten together; and sometimes where they are attended to they go in a direct line, but in some instances they occupy the entire road.

Is there a man to each horse?—In some instances one man has two or three horses.

What was the loading of the one-horse cart when you first had the management of

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of the Limerick road?—Not more than ten hundred. A shopkeeper of Nenagh told me, that the best tobacco was in hogsheads of twelve hundred weight, and that when he desired to have the best he was obliged to have a leading horse to the car that drew that hogshead.

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Can you acquaint the Committee what at any former period was the customary loading of a one-horse cart in Ireland?—I saw a fragment of a Report of a Committee published in the year 1745, which says, "And your Committee further report, that the average load of a car drawn by one horse in Ireland is 450 lbs." Mr. French of Roscrea had a horse that I understand uniformly drew three tons between Roscrea and his malt houses that were at Rackett Hall; there is an intervening hill of about one in fifteen to ascend.

What is the distance?—It was about a mile, or a mile and a half.

Mercurii, 24 die Aprilis, 1822.

Sir Edward Lees, Called in; and Examined.

HAVE any recent regulations been made in Ireland with respect to letters going to Scotland, or the north of England, by Donaghadee?—Not that I am aware of.

Sir Edward Lees.

What time does the mail arrive at Donaghadee from Dublin?—I think half past two o'clock in the afternoon of the day after they are dispatched from Dublin.

(24 April.)

What is the distance from Dublin?—Ninety-three Irish miles.

What time does the mail arrive at Belfast?—At eleven A. M.

What is the distance from Belfast to Donaghadee?—Fourteen miles.

What time does the packet sail from Donaghadee?—The harbour is dependent upon the tide; our sailing is quite uncertain; when the tide permits them they sail immediately, but the dispatch from Port Patrick is not till the following morning at six o'clock.

You mean the dispatch for London?—Yes; London, Edinburgh and Glasgow.

So that if the packet arrives at Port Patrick in three or four hours, the letters lie at Port Patrick till the next morning at six o'clock?—Yes; so I understand.

What time do the mails arrive at Port Patrick from London, Edinburgh and Glasgow?—I think at eight o'clock in the morning; it used to be so last year.

What time does the packet sail from Port Patrick?—It is liable to the same difficulties as Donaghadee, depending upon the tide.

At what hour does the mail leave Donaghadee for Dublin?—Six o'clock in the morning.

Then in due course letters are twenty-two hours between their arrival at Port Patrick and their departure from Donaghadee?—Yes; but I must observe, that by far the greater part of the whole correspondence in the year is conveyed by express, at a considerable expense; in fact, it is a daily increased expense beyond the usual charge for the mails.

Very few come from Donaghadee by the regular conveyance?—Very few.

Can you state the expense of this conveyance from Donaghadee to Belfast?—No, not precisely.

Is it incurred every day?—Our order is to send the mail by express immediately on its arrival after the departure of the Irish post in the morning.

What time does the mail leave Belfast for Dublin?—At three o'clock in the afternoon.

So that letters that leave Donaghadee at six o'clock in the morning go sixteen miles to Belfast, and then start at three o'clock the same day for Dublin?—Yes.

Does it frequently happen that many mails are due, at Donaghadee, together from Port Patrick?—I have upon several occasions been obliged to go down to Donaghadee and Belfast personally, in consequence of the interruption in the mails between the two countries, by Port Patrick and Donaghadee: upon one occasion when I was there, within these two or three years, I think I found twenty-two mails between the two places interrupted; I think thirteen or fourteen at one side, and the remainder at the other; I think that was at Christmas 1818; I was there last year; every year there is a considerable interruption, but that is the most alarming one that has ever taken place.

What was that occasioned by?—The difficulty certainly is the position of the harbour of Port Patrick. Upon that occasion I made a detailed report to the Post-

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Sir Edward Lees.

(24 April.)

master General, as to the state of the intercourse between the two countries, and I pointed out the evils that existed. My report was submitted to the Government, and upon that report the present harbour has been undertaken. Though I consider the chief difficulty to arise from the want of a proper harbour, there is, nevertheless, a great deal of improvement to be effected by a new arrangement of the northern mails in Ireland, and the whole of the mails on this side of the water to Port Patrick would have to be changed. The Postmasters General of England and Scotland have the matter under their anxious consideration.

Would letters come quicker from the north of England by Holyhead or Port Patrick?—Under the existing arrangements at Holyhead the intercourse is much more regular by that station than the northern one. With respect to Belfast, letters to Belfast are received through Holyhead under the present regulations a day earlier than by Port Patrick.

Do the letters from London for Belfast go by Port Patrick or Dublin?—They come now by Dublin.

Do the letters from Dublin for Carlisle go by Port Patrick or Holyhead?—We send them by Port Patrick.

Does it frequently happen that the communication is interrupted between Port Patrick and Donaghadee, in consequence of the state of the harbour and the bad weather?—Repeatedly; even without a gale of wind; when the wind blows south-west it completely impedes any egress from the harbour of Port Patrick. When those twenty-two mails were lying there, there were but two due by way of Holyhead, according to my present impression.

What would you suggest as the best regulation for expediting the correspondence by Donaghadee and Port Patrick between England and Ireland?—The distance from London to Port Patrick is 420 miles; the mail reaches Dumfries at half past four in the evening; it remains there for the arrival of the mails from Edinburgh three hours; the mail leaves Edinburgh at eight o'clock in the morning; by this delay at Dumfries it does not reach Port Patrick till eight the following morning. If, therefore, the mail could leave Edinburgh at six in the morning in the place of eight, it would arrive at Port Patrick at six o'clock A. M. If the mail travelled at a rate even under eight miles an hour, it would reach Port Patrick before five, the consequence of which would be, that if the wind was at all favourable, the English mail for Ireland, that now never reaches Belfast in time for delivery, or to be forwarded by any of the cross mails from thence, or to Dublin, would frequently be delivered in Belfast, on the third morning after the dispatch from London, before the hour at which merchants assemble on 'change; it would be in time frequently to meet the dispatch of all the cross-posts from Belfast, including Londonderry; almost invariably and in time to meet the departure of the coach for Dublin. In the departure of the coach for Dublin, I of course include the English correspondence for the greater part of the province of Ulster, and the entire of the south of Ireland from North Britain, which is now subject to the daily delay of twenty-four hours, and from the impediments already alluded to very frequent interruptions of a much more serious nature. With respect to the returning mail from Ireland, the effect would be, if a more expeditious rate of travelling was attained from Dublin to Belfast than at present exists, the mail might reach Donaghadee by one o'clock in the afternoon, or earlier; if, therefore, a steam packet was established, the same vessel that brought the mail from Scotland would be in time to return with the mail from Ireland the same day. Allowing three hours for the passage, which is only twenty miles, she might reach Port Patrick at four in the afternoon; by starting then from Port Patrick the mail might reach Dumfries, which is eighty-four miles, in ten hours and a half, at half after two A. M.; it might reach Carlisle in four hours and a half afterwards, which is thirty-six miles, and consequently it might reach London one day earlier than it does at present: the mail at present remains on its way from Port Patrick to London five hours; at Carlisle it does not depart until half-past seven A. M. therefore the mail from Port Patrick would be in sufficient time for the arrival of the Glasgow mail at that place, on its road to London, by leaving Port Patrick at four P. M. in place of eight A. M.

Veneris, 26^a die Aprilis, 1822.

Sir Edward Lees, again called in; and Examined.

HAVE the Postmasters General made any attempts to accelerate the rate of travelling by mail coaches in Ireland?—They have. Upon the different lines of road where the contracts have expired, since the Committee of 1819 made its report, the Postmasters General endeavoured to obtain the rate of travelling at least five miles and a half and six miles an hour Irish; at either rate of travelling they found it very difficult to prevail upon the contractors to undertake the contract; they have universally advertised in the public prints at both those rates. Upon some recent occasions they have succeeded in effecting five miles and a half, and very recently, in the case of Limerick, they have succeeded in getting the mails at the rate of six miles an hour and upwards; but this last case is very experimental, and my opinion is, that it is not likely to continue during the winter season.

Is not the road from Limerick to Dublin reckoned a very good road?—Taking it in the entire, I conceive the Limerick road to be the best road in the country.

Therefore there arises no difficulty to perform this rate of travelling on that road?—Not during day-light; but in those parts where the stages are travelled over at night, I think the contractors will find it difficult. I have before me a representation, received previously to my leaving Dublin, through Lord Dunally, chairman of the board of commissioners of that road, (that is, the road from Limerick to Naas,) representing the state of it, and the extreme danger there would be in continuing that rate of travelling if the road is not improved.

What defects does he allude to?—The following is a resolution, among others, which was unanimously agreed to: "As public intercourse is infinitely in danger by pits and ditches by the sides of the road, and by several narrow windings, or totally unfenced bridges in the county of Kildare; that such danger is much increased to the mail coaches which at all seasons travel through the said county each way during the night-time; that in consequence of the proposed great acceleration in their travelling, it is important, if not absolutely essential to their safety, that the said pits or ditches be filled, and the said bridges widened, fenced and repaired before the ensuing winter; that our chairman be requested to write, on behalf of the commissioners of the said road and the public, to the Postmasters General, praying their lordships to promote such legislative enactments, or other measures, as they shall deem best calculated to remove evils so long and so generally felt, and hitherto ineffectually complained of."

Are you acquainted with the conditions upon which Mr. Bourne is proprietor of this road from Naas to Limerick?—I have heard that Mr. Bourne and the late Mr. Anderson obtained a contract under the Irish Parliament, which vested in them, for a period of fifty years, the tolls of that road between Naas and Limerick; but I am not privy to the exact conditions upon which the tolls were so vested, or what sum of money they were bound to expend in bringing that road to a proper state; I presume they are embodied in the act of parliament.

Do you consider Mr. Bourne bound to remedy the defects of the road through the county of Kildare, the defects alluded to in the resolutions?—I apprehend he is not, under the engagement of his own act; but I consider, under the 45 & 46 Geo. III. he is liable to the responsibility of all trustees for tolls, and those bind him to have the post office surveys executed, on the county presenting damages.

By whom ought they to be provided for?—The law requires trustees to lay all claims for damages before a jury, and to submit the verdict to the county at the ensuing assizes. The damages being settled, the trustees should make the road.

Have the Postmasters General ever made any application to the grand jury of the county for that purpose?—The entire of that road has been surveyed by the post office, and the estimates for the different counties through which the line passes have been submitted to the trustees, I suppose.

Was any application made at the same time by the Postmasters General to the grand juries to have the improvements carried into effect contained in the plans?—The usual mode observed is, that the surveyor who makes the survey shall attend personally at the grand jury with the map and estimates of every improvement; and I have no doubt that such surveyor did attend the grand jury of the county of Kildare, if required.

Have other counties attended to the state of this road, and filled the pits and ditches, and made protecting fences against the precipices?—It is impossible

Sir Edward Lees.

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Sir Edward Lees.

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to answer exactly. The proceedings of the whole kingdom are contained in those returns.

What returns?—The returns of the whole proceedings of the post office and grand juries respecting the roads in Ireland under the post road acts.

To what do you attribute particularly the difficulty of getting mails in Ireland to go at the rate of five miles and a half an hour?—The answers that have been returned by contractors, to whom applications have been made to convey at that rate, have invariably been the imperfect state of those roads.

Do you know what the usual rate is at which common stage coaches drive in Ireland?—There are some that drive more rapidly than the mails; but generally speaking, I should think pretty much at the same rate; but I must observe, that the stage coaches are all day coaches, which makes a considerable difference in the facilities of acceleration.

Do the stage coaches on the Limerick road drive as fast or faster than the mail coach?—At present the mail coach travels quicker to Limerick than any coach.

Does the stage coach on the Limerick road travel at the rate of five miles and a half an hour?—I should think it does not.

What regulations are there with respect to the time allowed for delivering and taking up bags at the post office?—The time varies from three to ten and fifteen minutes.

Supposing there is no office business to perform, but merely to exchange the bags?—Merely exchange the bags.

You allow no time?—No; in fact there is nothing to be done.

Do you allow any particular time for changing horses?—Not upon the face of the post office time bill; that is included in the gross rate per hour; the contractors must make up the time that they themselves consume in harnessing the horses; it is not considered by the post office at all in its calculations.

Have any steps been taken for introducing a uniformity of plan in the construction of the mail coaches in Ireland?—That was a point particularly recommended by the Committee of 1819; and the sentiments of the Postmasters General were completely in unison with those of the Committee. They have had, however, considerable difficulty, as yet, in effecting it generally: one difficulty arises from several of our contractors being their own factors, having existing contracts, and unwilling to break up their own establishments for building.

Existing contracts for finding coaches?—Yes; in all contracts, however, made since 1819, the Postmasters General have advertised that the coaches provided shall be upon one principle of construction: to effect this, they advertised in the public prints for plans and models of carriages; and received proposals from different builders in Dublin, London, Oxford and Birmingham; the prices of those carriages, as proposed, varied from 250*l.* to 130 guineas each carriage, and a contractor at Birmingham has been found who builds them for 130 guineas; he has already provided several carriages for Ireland; and in all our future contracts we intend that this contractor shall provide them also.

Do you make a contract for the repairs with the person who finds the coaches?—No; we contract for the carriage, and the contractors themselves afterwards maintain them.

Then you give the carriages for nothing?—Ultimately the contractors pay for them. Stoppages are made from their mileage allowance.

What rate of allowance do you make to contractors for finding the coaches by the mile or otherwise?—We make no specific allowance for providing coaches, but we make an allowance per mile for conveying mails and providing coaches, which varies in amount almost in every part of Ireland. If the Committee wish, I can tell the amount of each line; for instance, from Dublin to Cork the amount is 3*d.* the single mile; to Limerick, 3*d.* but the contractor there requires 4½*d.* for travelling at the present accelerated rate; to Waterford, 4*d.*; to Derry, 3*d.*; to Belfast, 3*d.*; to Enniskillen, 4½*d.*; to Wexford, 6*d.* which includes the carriage of the second mail guard, and the charges for the conveyance of the Sunday mails; Sligo, 7*d.*; and Galway, 7½*d.* for a single mile; from Belfast to Derry the amount is 4½*d.*

How are the mail coaches in England provided?—There is one contractor who provides the post-office with coaches, and who keeps them in repair for a fixed mileage.

Do you know the amount of that mileage?—I have heard it stated at 1½*d.* the mile.

Have the Postmasters General of Ireland made any attempt to obtain coaches on the same principle?—They did; they made offers to some of the principal builders

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of Dublin, and they also attempted a negotiation with some of their own contractors who were builders of mail coaches, but the terms that were asked were considered too high, and they abandoned the idea.

Can you state what those terms were?—I think they were as high as 9*d.* the double mile by the mail builders and mail contractors; I think they were 4*d.* or 5*d.* the single mile.

In England, do the post office or the proprietor pay the mileage for the coaches?—I believe, in some cases, the sum paid by the contractors for the coaches exceeds what they receive for the conveyance of the mail.

Who pays it?—It is paid by the post office, I believe, as the responsible party; they have regular accounts with the contractors afterwards for that contribution.

What rate is paid by the Postmasters General in England, for carrying the mails, to their contractors?—I have heard it as low as 2½*d.* the average, a mile; I believe the Holyhead mail is 3*d.*

For what periods do the Postmasters General of Ireland make contracts for mails?—The lowest is seven years; they have been as extended as fourteen and twenty-one; and the Limerick mail, which has but one year to run, was made for a period of thirty-one years.

Do the Postmasters General endeavour to make the contracts for as short a time as possible?—They always advertise for seven or fourteen years, and are always anxious to obtain them for the shortest possible period. On several roads no contracts have been executed for years past, though expired.

Why do they take seven years as the shortest limit?—Because they have always found that where an individual wished to contract, that he would not contract for a shorter period, because the expenditure on his outfit is of course very large, and it is necessary to have a certain guarantee for a sufficient period to be indemnified.

For what period are the contracts made by the Postmasters of England?—From year to year, I believe.

Have the Postmasters General of Ireland ever endeavoured to make a contract for a less term than seven years?—Frequently they have made attempts to obtain their contracts upon the same principle as the contracts in this country; namely, from year to year, and to have them managed by the innkeepers on the different lines of road. Since the Report of the Committee of 1819, they have renewed those attempts at different periods, and sent down their superintendent of mail coaches upon the different lines of road, with a view to make such bargains; but we have hitherto found it quite impracticable.

Are you aware that the Postmasters in England never make any bargains in detail with the innkeepers of the lines of road, but always with some chief contractor, who manages all the details with his country connections?—I am; but unfortunately in Ireland we have not discovered any such class of persons: our contractors are in most cases gentlemen of considerable property, and in some cases have been the noblemen of the country, who, from a laudable public spirit have connected their names and security with such speculations.

It may be understood by the Committee, that the business of stage coaches has not yet made sufficient progress in Ireland to enable the postmasters to find persons willing to enter into mail coach contracts upon the same principles upon which they are made in England?—In a great measure; but the stage coaches at present possess such advantages over the mail coaches, from the local circumstances of Ireland, that I very much fear they will always have the preference as a means of travelling.

Is the stage coach business of Ireland increasing much?—I do not know that it is extending very much; on the contrary, I rather apprehend the interests of the different persons embarked in that business are very much depreciated.

It has, however, made great progress within the last ten or fifteen years?—Certainly it has; but unfortunately there is a description of carriage at present in use in Ireland which very much interferes with the interests of the stage coach proprietors, and still more so with the proprietors of mail coaches.

What is that?—That is the caravan, carrying a great number of passengers at very low rates, and paying very moderate toll duty.

What is the rate of travelling on the cross roads?—Four miles an hour.

Do you not think you could get them to go faster than that?—I do; and I think they ought to go faster.

What is the time for the arrival of the mail at Newry?—Five o'clock in the morning.

And the arrival at Down afterwards?—Fifty-five minutes after eleven.

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What is the distance?—Twenty-four miles.

Why is there a delay of seven hours from Newry to Down, that being only twenty-four miles?—The mail requires six hours in its conveyance only, and therefore if it was dispatched immediately after the arrival of the mail coach it ought to reach Downpatrick at eleven.

Why is it not dispatched immediately on the arrival of the mail coach?—The only reason can be that they may go more safely during the winter season.

From what cause?—To have one hour more day-light upon the road.

Did you ever hear of any thing having occurred to the mail in that part?—I do not remember any attack upon the Down mail.

Did you ever apply for any contract for a mail coach upon that road?—Frequently.

Have you had any offer?—I think we had one, but it was very high.

Do you recollect the sum?—I very recently had a communication with a view to a contract for a mail coach on that road, and I am in expectation of a proposal for it.

What regulations or changes have the Postmasters General already made or contemplate to make, in the system of Irish mails, in consequence of the introduction of steam packets on the Holyhead station?—They have already extended the hour of dispatch from seven o'clock in the evening to ten o'clock at night.

For England?—For England; for the inhabitants of Dublin they have extended it, from the interior of Ireland, till seven the following morning, both mails going then together, by which means the inhabitants of Dublin have frequently been enabled to answer their letters the same night to London; and the mails from the interior of the kingdom have gained one entire day in point of acceleration. It is a question with the Postmasters General, at this moment, whether it is practicable to keep open the receivers from Dublin to the latest possible hour of the night, so as to afford the merchants two hours at least more time to answer their correspondence, but they have not yet determined upon that measure; not being quite satisfied, with the business that is to be performed in the morning in the arrangement of the interior mails, whether that from Dublin, if so extended, could be made up in sufficient time to insure its dispatch from Howth so as to meet the mail going from Holyhead to Chester and Liverpool.

Are any letters allowed to be put in the post before seven o'clock in the morning for England from Dublin?—No.

When do the steam packets leave Howth?—As near eight o'clock as possible at present.

Is that hour sufficiently early, in ordinary cases, to insure the arrival of the packet at Holyhead before the dispatch of the mail coach from Holyhead to London?—In almost all cases it is.

Is it equally so to insure the dispatch of the mail for Chester and the north of England?—Not with always the same certainty; and I rather apprehend that the mail on the Chester line has frequently been late.

Does not the mail by Chester carry a very important portion of the correspondence between Ireland and England?—A very important part indeed, that is, of the commercial part of the correspondence.

Would it be possible to effect the arrival of the mails at Howth sufficiently early to enable the packets to proceed to sea at seven o'clock in the morning?—It would be quite possible to do so; but in order to effect that arrangement, our interior mails must be made to arrive earlier in Dublin; and to do this, they must either leave the extreme points of the kingdom earlier than at present, or should be made to travel at a more rapid rate than they do now. To prevent the inconvenience that might arise by making the mails depart from the extreme points earlier than they do, it would be possible to dispatch the mails earlier than they are at present from Dublin; which would have the effect of giving an equal quantum of time at the extreme points of the kingdom to answer their letters, that by the other arrangement they would be deprived of; the danger of this, however, might be to delay the English mails from the capital, by not reaching Dublin from Howth, previous to their dispatch.

Has it often occurred, since the establishment of steam packets, that any of the mails from the interior of Ireland have reached the post office so late in the morning as not to enable the Postmasters General to forward the letters to England?—It has; during the winter season, on some lines, the mails had been detained; in some cases the Postmasters General have sent those mails across in express boats, to overtake the packets, at the expense of the contractors.

Upon what lines of road most frequently have the mails been late?—Upon the Wexford

Wexford line most frequently; on the Cork line sometimes; I think on the Derry line, and on the Enniskillen line also.

Have the Postmasters General adopted, or do they mean to adopt, any measures to remedy this evil?—Their lordships hope, that in the expected improvements of the public road this evil may be effectually remedied; for the delays that have already been experienced, have been by the contractors attributed to their very bad state at present.

Do the Postmasters General consider that the defects of the road are the cause of those delays, or do they attribute it to the misconduct of contractors?—In most cases they have hitherto considered them to be owing to the bad state of the roads, and the very inclement season that is just past, rendering the roads still worse, they have subjected their contractors to very large fines in the first instance; we have in most cases given them back, under the explanations that they have afforded.

Do the representations made to the Postmasters General, as to the state of the roads, apply partially, or do they extend to all the mail coach roads?—I think the complaint seems to be general throughout the whole country; I do not mean to say that every part of every line is in a bad state, but I apprehend that there is no line that is not liable to considerable difficulties through the whole country, in consequence of their bad state at present. I have here returns from each contractor as to their actual state when I left Ireland, and they will more properly inform the Committee than I can possibly do myself. Previous to my leaving Ireland, I addressed a letter to the different mail coach contractors, of which I have a copy: I have received answers from them all, with the exception of one or two; those answers enter fully into the subject of the respective lines, and with the permission of the Committee I shall prepare a table, which will set before them every information which they can require upon the subject.

[The witness was directed to deliver in the letter and prepare the table.]

Are the mail coach roads for the most part turnpike roads or presentment roads?—I think, generally speaking, that where mail coaches run, about one-half is turnpike and the other presentment road.

Are there not particular acts of parliament for enabling the Postmasters General to have the mail coach roads placed in proper repair?—There are; viz. the 45th and 46th of Geo. III. passed in the years 1805 and 1806, enacted for the express purpose of rendering the conveyance of letters more safe and expeditious in Ireland.

What measures have the Postmasters General adopted towards carrying those acts into effect?—In 1805, when the first act was passed, the instructions of Government were served upon the post office to commence the execution of the act; and the first step which the Postmasters General took was to appoint six engineers under the direction of another and principal engineer; this last gentleman is the present Major Alexander Taylor, a gentleman of great experience, to whose direction and control the management of those acts under the Postmaster General is principally committed: they executed their warrants immediately, and under them proceeded to survey every direct line of road from Dublin to the extreme points of the kingdom; the surveys of all those roads have been in the interval completed, the plans and estimates of such new lines as were necessary, or of such lines as were required to be altered or widened or levelled have also been submitted to the grand juries, in such cases as were necessary to the trustees of turnpikes.

Did those plans describe every sort of improvement that was necessary to make each road perfect in point of direction, of the inclination of the hills, and as to breadth?—They did; the general maps were all furnished, and from them the baronial maps; and the necessary plans for bridges have been submitted to the different grand juries.

Were they accompanied with cross sections and estimates?—I am disposed to think they were.

On what principle do the acts require those surveys should be made in regard to the breadth of the road and the inclination of the hills?—There are two acts. The 45th of the late King required that the roads should be brought to the level of one foot rise in thirty-five base, and that the roads should be of the width of forty-two feet clear of footpaths at least, and that in no case should the road exceed sixty feet.

Have many roads been improved in Ireland in consequence of those surveys under the powers of those acts?—Several improvements have taken place, all of which are more particularly described in the returns which the Postmasters General have furnished in obedience to the orders of this Committee:

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Do you mean to say, that in all cases of new roads made under that act, that the best line of road has been *bond fide* selected?—I am not aware that the Postmasters General are apprised that any line of road submitted by their engineers to any of the grand juries has not been the best that could be discovered, under the particular restrictions that the acts themselves impose; but whether or not those particular lines have in all cases been adopted by the grand juries, I cannot exactly say at this moment, though my impression is, that in many cases the lines suggested have not been adopted; but I fear that alterations even in the line since made, have been effected by the persons employed in the execution of it.

Have you any reason to doubt, that, in many instances, the grand juries have deviated from the lines recommended by the engineers, and adopted others not so advantageous to the public service?—From the information I have received, I have no doubt that such alterations have been made, which will be more particularly described in the returns I have already alluded to.

Have you any reason to suppose then, in any instances, lines of road have been chosen by the grand juries where the performance of the work, as a permanent work, is utterly impracticable?—There have been different lines of road, which, under the orders of Government, the Postmasters General have been obliged to make special re-surveys and inspections of; the levels upon those roads are particularly set forth in the returns ordered by and furnished to the Committee, and I have no doubt that they do contain instances such as are alluded to.

Have you any knowledge of the new mail coach road opening an intercourse between the city of Limerick and the town of Tralee?—That is one road that we have surveyed and re-surveyed, and upon which a special investigation took place, and a special report was made.

Has a copy of that report been laid before the Committee?—A copy of it has not yet been laid before the Committee.

Is it in progress to be laid before the Committee?—It is in preparation, I believe, by the Government of Ireland.

Do you happen to know, or can you inform the Committee, whether the engineers reported any one line of road between those two towns as more practicable and much shorter?—I do not remember at this moment.

Was there more than one line of road surveyed for the purpose of making a new mail coach road?—I am sure there was.

Do you happen to know the distance by the new mail coach road that was adopted by the grand jury between Limerick and Tralee?—I do not; the maps are in Ireland; but the returns will show it.

Do you happen to know the distance between the same towns going along the Ardagh line of road, which was surveyed by the post office engineers?—I do not know them myself, but they are all set forth in the map, and stated in that report.

Are you aware of any reference to the engineers of the post office, with respect to the preference between those two identical lines of road, the one leading through Armagh, and the other by Cappagh and Talbot?—The order given to the engineers was, to make a special report upon what was executed by the county, as contrasted with the original maps and estimates furnished by the post office. The result of that is contained in the statement that I have already referred to.

In the choice of the line of road, under the direction of the post-office, has it been an object to embrace the principal towns in the respective counties through which the roads pass, if it could be done consistently with the other objects?—The act of parliament requires, that the post office engineers should proceed from post town to post town, finding the most direct and level road between those places, giving the post office, however, the power to exclude or embrace any particular place or places that might be necessary towards the great object of those acts; which is, the acceleration of the mail to the extreme points of the kingdom; I should say, by the extreme points, the principal cities and towns in the kingdom, which are, in fact, the extreme towns.

Do you happen to know what principal towns of the counties of Limerick and Kerry the new mail coach road to Tralee passes through?—I cannot say, without having reference to the designs of the road.

What control have the postmasters over the grand jury, so as to secure those lines of road being made, which the surveyors of the post office have designed?—The duty of the Postmasters General is solely confined to the making of the maps, preparing the estimates, and furnishing them to the grand juries, and defraying all the expenses of the surveys, and the attendance of the engineers upon the grand juries. With the performance of that duty, the power and authority of the Post-

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masters General cease, and they have no sort of control over the grand juries, or over the persons who are afterwards employed in the execution of the designs for which they have paid.

Has the Government of Ireland any control under the act?—None whatever; the only duty that remains with the Government is, the advance of the necessary funds to the counties to enable them to execute those works: they possess no power, that I am aware of, that enables the Government to ascertain whether that money is expended at all, or whether the lines themselves have been formed according to the designs of them, as furnished by the post office engineers.

What does the act require as requisite to enable the grand jury to obtain advances of money from Government?—A certificate must be sent to the Treasury, of the approbation of the road, and that all damages arising from individuals whose property has been surrendered have been satisfied. Upon that being presented to the Treasury, under the proper authority from the grand jury, the Government is authorized to advance the entire of the money necessary for the execution of the works, which the Government does advance, without interest, and is repaid by equal instalments in six years.

Do the Government advance the whole sum at once?—They have authority to do so if the county think it necessary to make the application.

Then there is no provision in the act to enable the Government, or to require the Government to take precautions that the money is faithfully applied?—No; in this respect the act is totally defective.

Do the acts contain any provisions by which the roads may be kept in repair after being once made?—None whatever; their repair after comes under the ordinary presentment system, and liable to all its casualties.

The present bad state of the mail coach roads may then be attributed to neglect in common repair more than to the want of completing the improvements under the mail coach acts?—Several of those roads that have been completed are, I apprehend, in as bad a state, though perhaps not so hilly, as those upon which nothing yet has been effected, which I entirely attribute to the deficiency in the system and the imperfect state of those two acts, which have made no sort of provision for the continual maintenance of them; and it must be quite evident, that where those roads have been made double the width that they were, they must daily be coming worse in that broad state than they originally were, and eventually must be a great deal more expensive to put in a proper condition. I attribute the present bad state of the roads to two causes; to many of the improvements not being made at all; and where made, the roads not properly kept.

Have the new roads made under those acts of parliament been finished in such a manner as to continue in a sound and perfect state for a considerable time after they are completed?—Many of them I do not think have; and I am positive that very few, if any of them, have been made as perfect as the nobleman who designed those acts, himself contemplated; but the exact condition of them will more fully appear to the Committee from the table that I shall prepare.

Do you think it desirable to make any alterations in the provisions of those acts?—Every Postmaster General, from 1807 to the present time, has entertained that opinion; indeed, the very second year that the acts were in operation, the want of such a system was quite apparent.

In what respects do you propose to alter them?—I should make such alterations, in the first place, as should diminish the expenses of them in the outset.

The expense of the roads?—Of the roads and the whole system: to do this, I would endeavour to assimilate, as nearly as possible, the present act of parliament to the statute at first introduced; I mean the 45th of George the Third: by such an act as this, the expenses of the post office would be greatly reduced in the attendance of the engineers upon the grand juries. It is quite evident, that while one grand jury possesses the power of not acting upon the post office design, while the grand jury of the adjoining county does act upon the design in that county, that the object of these acts can never be attained; and thus we have already instances in Ireland. Some of these roads have been executed by some of the counties, while the counties that intervene between that road itself and the capital have refused to make their part; in this respect particularly, I think these acts should be altered; it is quite ridiculous that the county should be subject to a large expense in one case, and that that expense should be rendered useless by the adjoining county not performing their part; and therefore I conceive it would be better to repeal both the acts *in toto* than have them in such an imperfect state, and so burthensome in point of expense upon the country.

How

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How are the provisions altered in the original act which you now wish to have re-enacted?—The act of the 46th repeals several of the clauses of the act of the 45th; it gives the grand juries such a discretionary power as has certainly contributed to prevent the original intention of the first act: the original act enabled the counties, with the assistance of the Treasury, to complete the roads, and levy their disbursements, in the period of six years. It is now seventeen years since the original act passed; the roads have not been by any means perfected; several of them are in a very bad state at periods, and many of them will never be perfected, I fear, under the present system.

Are the roads you now speak of, roads made by advances of the public money from the Treasury?—Yes; several of them are represented as much out of repair.

How much money has been advanced by the Treasury under those acts?—A special return of the amount has been made to the Committee, and I think it comes to between six and seven hundred thousand pounds.

Is that money to be repaid by the counties?—I believe the counties have repaid every thing to Government that the law required of them.

Can you state what sum has been expended on roads under those acts?—That is one of the great difficulties that the Postmasters General found in making the returns which the Committee called for; they have not the means themselves of knowing exactly the proceedings of the counties, and the information which they have rendered to the Committee in these statements, is the result of inquiries which they have themselves made of their engineers, who have from time to time reported to them what they understood the grand jury still performed.

Can you state the amount or any thing near it?—The amount does not much exceed, I apprehend, the money that has been advanced by the Treasury, and therefore the Committee will find that in the returns which are before them what it is. I am not exactly in possession of, or have I any means of knowing accurately.

Is there much new road on hand at present to be perfected?—I apprehend a great deal. I mean still to be made of what has been surveyed.

Can you state what sum of money is estimated to be wanting for completing those roads?—I think the gross estimates the Committee will find in the returns I mentioned; about a million and a half for the whole kingdom: the amount upon each county will be found separate in those returns.

Do you speak of the estimates made in the first instance, immediately after the passing of the act, by the Postmasters General, for all the mail coach roads of Ireland?—I mean the amount of all the estimates that have been furnished with plans to the different counties both for roads and for bridges on mail coach roads; except two roads provided for in the acts: the surveys of the *cross roads* have not yet commenced.

Have the expenses of many of the roads much exceeded the original estimates?—Some of them have very largely exceeded.

Can you state any particular instances?—The Committee will find in the returns which they have received, the particulars of each as far as the Postmasters General have learnt them. My present recollection enables me only to state instances in the counties of Cork, Kerry, Limerick, Wicklow and Fermanagh. I think in those cases the excess of expense has been considerable.

Has that excess been owing to any defect in forming the original estimate, or any mismanagement in the expenditure of the money upon the road?—I cannot speak with certainty; in some of those instances special investigations have taken place, by orders of Government, and reports have been made to Government; they will be found in the returns before the Committee.

Were the persons employed to make the estimates persons in every respect competent to make them upon proper principles?—On the appointment of the engineers, the Postmasters General selected the most efficient men that they could find in Ireland; and all the designs previous to going before the grand juries should have been, and I am sure were compared personally by the superintending engineer himself, Major Alexander Taylor.

Has the excess above the estimates been in any case particularly high?—I think it has been double in some cases; there is one instance on the road from Cork to Skibbereen.

What has the post office paid for surveys of the mail coach roads?—Our expenses have amounted to 50,000 *l.* in the seventeen years, to carry into effect the provisions of the act.

Can you state what portion of the whole of the mail coach roads has been improved under those acts?—As far as we have the means of learning, the Committee will find in the returns.

Luna, 29^a die Aprilis, 1822.

The Very Reverend *Thomas Trench*, Dean of Kildare,
Called in; and Examined.

Rev. T. Trench.

(29 April.)

DO you reside in the neighbourhood of the Dublin and Limerick road?—I do.
In what part of Ireland?—In the Queen's county, about three-and-thirty miles from Dublin.

Have you occasion to travel this road frequently?—Very frequently.

In travelling along this road, have you paid attention to the manner in which it is repaired?—I have for some time past paid very particular attention to it, from two causes; first, from being a supervisor of other roads in that neighbourhood; and, secondly, from having been informed that I was appointed one of the commissioners under the act of parliament for superintending that road.

In what manner is this road superintended?—Messrs. Bourne and Anderson have the management of it by an act of parliament originally passed in the year 1793, as I apprehend.

That is, the Irish Parliament giving to them this road for a certain period of years, allowing them to receive certain tolls on condition of keeping the road in repair?—They advancing a large sum of money (17,000*l.* I believe) for making improvements and keeping the road in repair.

Are there commissioners to control the conduct of Mr. Bourne and his partner?—There were commissioners originally named in the act for the purposes of control in the said act specified.

In case of Mr. Bourne neglecting to keep the road in repair, is there not a power in the Lord Chancellor to sequester the tolls?—There is.

Does it go to appoint new commissioners?—No; on the representation of a certain number of the commissioners, in the form of a petition to the Chancellor, stating that the road is not in sufficient repair, the Chancellor has the power of sequestering the tolls.

In what sort of repair is that part of the Limerick road with which you are acquainted?—In general, in very indifferent repair; I speak of the part between Naas and Maryborough.

What are the chief defects of it?—The road is, for the most part, in itself of a very fine breadth, perhaps fifty or sixty feet; but it is only about twelve or fourteen feet in the centre that is kept in any tolerable repair, and even that is very rough, from the stones not being sufficiently broken; and the consequence is, that all carriages, carts, &c. endeavour to keep as much as possible in one track, on the centre or crown.

What materials are made use of?—Chiefly broken stones, and in some cases gravel.

To what size are the stones reduced before they are put upon the road commonly?—They are for the most part laid in heaps upon the road, of the size they come from the quarry; they lie on the road generally for some time before they are broken, and then they are broken to three, four and five inches diameter.

Is it the practice to leave those stones so near the central parts of the road as to be inconvenient to travellers?—Yes; they do incommode travellers very much; they are inconvenient in the day time, and dangerous in the night, as I have often experienced, and represented to Mr. Bourne.

Was not this road some years ago in a much better state of repair?—It was.

So as to be considered one of the best roads in Ireland?—Perhaps it might; but road-making had not then attained its present state of perfection.

Is there any difficulty in obtaining materials?—None, that I am aware of: during these last six months there has been a difficulty in some places, occasioned by the very great wetness of the winter, but in general there has been no difficulty.

As a supervisor of roads yourself, you are acquainted with the expenses attending the repairing of roads?—I am of private roads, but this is very different.

In your opinion might not this public road be kept in very good repair at a moderate rate of expense?—Certainly I think it might be kept in very good repair by the tolls that are levied on it, and a full and sufficient profit left for the contractor; but having never made any calculation upon the point, I cannot pretend to speak with certainty.

Are you a magistrate of Queen's county?—I am.

Have complaints come before you of nuisances committed upon this road?—Yes, very frequently; and I have observed several myself; but I found that I could not control them by any of the provisions of the general road act, or of any other

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(20 April.)

road acts, on account of a clause in Mr. Bourne's act, which states that it shall not be subject to the penalties of any other act. Mr. Bourne's act also provides in itself heavy penalties for any neglect of any duty in the overseers acting under him; but that provision is rendered wholly ineffectual, because it is also provided, that all fines levied thereunder shall be paid to Mr. Bourne himself, to be disposed of on the road, or in such manner as he shall think proper for the benefit of the road.

Are not some parts of this road very narrow and unprotected against very deep pits and ditches on the sides of it?—There are some parts of it unprotected, and a few parts very narrow in the county of Kildare.

Are there any recesses formed along the road for holding materials?—Very few, if any; but there are many waste places, which at a trifling cost might be had for the purpose.

Does not Mr. Bourne's act provide that such recesses shall be made?—There is a clause in the act, which empowers him to rent or purchase lots of ground for that particular use, and for depositing the scrapings of the road; and I am informed that it is incumbent on him under that provision so to do.

Has the road been much improved in the Queen's county by the assistance of the grand jury?—Very much.

In what way?—In filling up ditches, I believe, through the whole length of it, and making many footpaths.

Has this been productive of a broader workable part of the road for the use of carriages?—If kept in proper repair it would; but in the manner in which Mr. Bourne keeps it, I do not think it does.

That is, the hard materials are not spread to a wider distance than formerly?—No; a considerable breadth at either side is left in such inequalities, that a carriage cannot safely go on it, and scarcely even a horse.

Has not the expected advantage of this improvement, by widening the road, been counteracted also, in consequence of Mr. Bourne's overseers being in the practice of putting down heaps of stones much too near the central part of the road?—It has, very materially.

Do you think that that degree of attention is paid to this road which the public have a right to expect, in consequence of Parliament having vested so important a trust in the hands of Mr. Bourne?—Certainly not.

Is this opinion an opinion that is generally entertained amongst your acquaintances in the part of the country in which you reside?—Very generally: the gentlemen have had meetings on the subject.

To what meetings do you allude?—I allude to meetings called for the purpose of filling the vacancies that occurred by death amongst the commissioners, as the first step towards bringing Mr. Bourne to a proper sense of his duty to the public.

The necessity of these meetings has therefore originated altogether from the defective state of the road?—I think so; and I think Mr. Bourne would never have heard of the commissioners if he had done his duty to the public, by keeping the road in the order he ought.

Do you think that the act under which Mr. Bourne holds possession of this road provides a sufficient remedy for the inconveniences you mention?—I do not think it does, because the commissioners can do nothing except petition the Chancellor; and they are precluded from all the other remedies provided in the general road act, by the clause I have already alluded to.

Why should not such a petition be attended with the interference of the Chancellor in the manner this act admits of?—We do hope and believe it may, but we are subject to the expense of a sort of suit in Chancery to bring it about. The remedy that is provided is, that a certain number of the commissioners shall petition the Chancellor, and the Chancellor, on hearing the petition, may order the tolls to be sequestered until it is put in proper repair, and then he has the power of restoring the tolls to Messrs. Bourne and Anderson.

Have the commissioners ever availed themselves of the power given them by the act?—Never.

Are you aware what the expense would be?—I am not aware what the expense would be; whether it would be a public petition, or a thing that would be heard by the Chancellor in private; but in either case we should be liable to the expense of feeing counsel, as Mr. Bourne of course would fee counsel in his defence.

Do you think he has sufficient remuneration for keeping the road in order?—I do.

Upon what ground do you form that supposition?—The principal ground on which I form the supposition is this: in the year 1793, Messrs. Bourne and Anderson obtained

obtained an act vesting that road in them; one of the terms was, that they were to advance a large sum of money (17,000*l.*) for putting it in repair; this act passed after much discussion in both Houses of Parliament, and vested it in Messrs. Bourne and Anderson for thirty years only; but afterwards, in the year 1798, a clause was tacked to another act of parliament, granting them this road for fifty years from that time, without being required to advance any further sum. That passed, as I am informed, without any discussion, in the height of the rebellion, so that few persons knew of it for many years after.

What was the state of this road before the year 1793?—I have heard and believe it was in a very bad state; but not having lived in the country at that time I cannot speak from my own observation.

Do you know what the state of this road is between Maryborough and Limerick?—I have not travelled it lately; but from many friends who have gone, I understand that, except a little about Nenagh, it is still worse than that within my own immediate observation.

Are any conditions required by the act of 1793 to be performed by Mr. Bourne which have not been complied with?—Yes, certainly; he was to keep the *whole* of the road in sufficient repair.

The question related to the footpaths?—Whenever the county presented any sum not less than one shilling a perch for footpaths, Mr. Bourne was bound to make and keep them in repair; this he has neglected: in most instances he has entirely neglected to keep them in repair.

After the counties had granted money for making them?—Yes; and often granted much more than the act requires: he has also wholly neglected to provide finger posts, as required by a subsequent act.

Mercurii, 1^a die Majj, 1822.

Sir Edward Lees, again called in; and Examined.

SINCE you were last before the Committee, have you turned your attention to those improvements and alterations in the present mail-coach road Acts, which are requisite for securing a better state of the public mail roads in Ireland?—I have carefully read over the two Acts of the 45th and 46th of George III, and as I stated before, the chief alteration I would suggest in the present state of the law, would be such as would render the operation of those Acts least expensive to the post office, and less expensive to the country. It has occurred to me, that one reason amongst others that has induced the grand juries to reject the applications that have been made from the post office, is the consideration of the great expense that the execution of the act in its present state would have entailed upon their counties. I would therefore so change the law as might meet those objections and difficulties. At present the law requires that the post office plans shall be estimated for roads at the breadth of forty-two feet at the least, or fifty feet in the maximum. The law also requires that the inclination of the road shall not be greater than at the rate of one foot rise in thirty-five feet of base. In the obligation that this provision of the law, to obtain a road at such inclination, imposes the consequent expense also has been such, that I apprehend this has operated as another cause towards inducing grand juries to reject the applications; whereas they might have presented, had a plan of a narrower road, though more inclined, been submitted. Under the present system besides, there exists no sort of intelligence or concert between the counties in the consideration of the component designs which constitute each great line from the capital. At the same assizes one county presents its own share of the road, while another county, perhaps, refuses. One grand jury presents in part at one assizes, and at the next assizes, under a traverse, the succeeding jury rejects what was before even approved of. The traverse must either be resisted by the post office at a considerable expense, or the road is lost altogether, while its connecting part in the adjoining county has perhaps been finished. This I consider an unfortunate anomaly in the present system. I would therefore revive the clause which has been repealed in the 45th of Geo. III. which prevented any traverse except for damages. The post office has already experienced such difficulty in carrying those Acts into execution, and their proceedings have been attended with expenses so much beyond what they themselves expected, and certainly beyond what the original Act contemplated, that for some time past the Postmasters General have found themselves obliged to suspend altogether the further execution

Rev. T. Trevelyan.

(29 April.)

Sir Edward Lees.

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of the Act, although they have not yet proceeded upon the survey of any one cross-mail road in the kingdom, with the exception of those two particular roads directed to be surveyed in the first instance by the statute. In any alteration of the Act which may be made I would recommend a clause to be introduced, requiring the post office to re-submit their designs to the different grand juries who have hitherto rejected them. I would require the post office, exclusively of the estimates upon which those designs are now formed, to submit an additional estimate made for a road of thirty-two or thirty feet in breadth, instead of forty-two or fifty. I would also authorize the survey to embrace a road of which the inclination may be at the rate not exceeding one foot rise in one-and-twenty feet of surface, and this only in cases where the length of the hill did not exceed from a quarter to half a mile. Having so submitted those plans, it would be then a consideration whether it should be imperative on the counties to present one road or the other; but if it was not thought necessary to make it imperative, I would recommend that the 17th clause of the 45th of Geo. III. should be revived, which limited the future presentments of the county until the post-roads of that county should be first completed. I would introduce also a clause prohibiting any person but the post office engineer from lockspelling, or marking out any new line of road for execution; and I should either make the post office engineer superintendent of that road while executing, or I would inflict heavy penalties on any deviation by any other engineer from the official line so traced. If the post office engineer should make the road, I would make it imperative on him to attend the quarter-sessions, to submit his accounts for examination; he should also attend the grand jury at the assizes for the same purpose; and before his charges should be paid by the post office, I would recommend that he should bring a certificate from the grand jury to the Postmaster General, that they had approved of his proceedings. I think upon this plan three years should finish all the roads that remain unperfected.

What part of the mail-coach roads is under the management of the counties, as distinguished from those that are under the management of the turnpikes?—I think nearly one half.

Do those Acts, or any others, provide any means for securing the repair of the mail-coach roads?—Those two Acts provide no specific means at all. The roads, when made, fall under the general system of county presentment, and become subject to all its casualties.

Then it is quite accidental whether any mail-coach road is kept in proper repair?—Perfectly so; it entirely depends upon the gentlemen of the country.

Suppose a road was allowed to go so much out of repair, that instead of a mail-coach being able to drive five miles, or five miles and an half, an hour, it would not be possible to go more than two or three; do any of the Road Acts provide any means by which this great inconvenience to the public might be remedied?—There are several general Road Acts in operation in Ireland which provide certain means of repair; I think particularly, the 49th of Geo. III. which Act I have in my hand. This Act provides that certain sums may be expended under supervisors, which they are authorized to expend at a rate not exceeding 1s. per perch, within the immediate district of such supervisor.

Then those repairs depend upon the previous appointment of a supervisor?—Certainly.

Suppose no supervisor appointed, is there then any remedy?—I am not aware of any that is not quite accidental.

Are you aware of the remedy that the English law provides in case of roads being allowed to go out of repair?—I believe the English roads are under the direction of the particular parishes, in most cases; those that are not turnpike roads.

Do not you know that every road in England can be indicted if out of repair?—I am quite aware that such a power exists by which parishes may be compelled to keep their roads in proper repair, being liable to prosecution if they do not.

Are you aware of that clause of the 49th of the King, allowing grand juries to appoint supervisors, having been much acted upon?—I am aware that it has been acted upon, and is acted upon in different parts; I am not aware exactly to what extent, but on the roads in the western part of Ireland, I understand it has been pretty generally adopted.

Has it come under your observation whether the roads that are under supervisors are in better order than those that are not?—In the returns that I have here, which represent the general state of the principal mail-coach roads in Ireland, I find that the mail-coach roads in the western part of Ireland, namely, from Kinnegad to Sligo, from Ballinasloe to Westport, and for the remainder of the line from Athlone

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to Galway, are principally managed upon that plan; and on such parts as are so conducted they appear from these returns to be generally in better order than any of the other roads which this return embraces; and it also appears that they are kept in excellent repair for the sum of money which the law provides.

Would it not be desirable to provide some process by which the constant repairs of the mail-coach roads which are under the management of the counties may be secured?—I can conceive nothing more necessary towards putting them in a perfect state, and maintaining them well and cheaply.

Is it possible to carry on the mail-coach system with that certainty and uniformity which is essential unless such an arrangement takes place?—It is quite impossible that the conveyance of the mails in Ireland can in point of expedition or safety be conducted upon the same principle that they are in this country, unless some system is established in Ireland by which the public roads can be relieved from their present imperfect state, and their future good order at all times secured. From the return which I have prepared, there appears to be very few, if any, of them that are not at present much out of repair, narrow, hilly, and with dangerous gripes and ditches on both sides in many parts. From the rate of travelling that we wish to establish in Ireland, it is evident that nearly three-fourths of the distance of each mail coach must be passed over during the night time if that expedition is obtained; and it must be evident that if such is the case, and that the roads are bounded by those deep ditches, that neither safety or expedition can be secured.

Has not the regular arrival of the mails in Dublin become of much greater consequence since the packets have sailed from Howth in the morning?—It has become particularly so, for the certain dispatch of the entire correspondence from the interior, depends upon the punctual arrival of the coaches in Dublin at the latest at six o'clock; we have been obliged in consequence, in order to secure that dispatch, to curtail already the time that has hitherto been allowed to the north of Ireland, connected with the Belfast road for its correspondence. I think we have been obliged equally to curtail the time that was allowed at Waterford, and if I mistake not, at Derry.

In case the trustees of any turnpike road in Ireland suffer the road to go very much out of repair, do the laws provide any remedy for the public?—Each turnpike act has its own peculiar provisions. I am not aware, (except in two cases, namely, the roads to Cork and Limerick, which have been vested in individuals,) that there is any remedy in the case of any of the other turnpike roads.

Can you give the Committee any information respecting the expense of keeping roads in repair in Ireland?—The best opinion I can offer to the Committee is contained in the return that I have prepared them from the different mail-coach contractors in Ireland, who of all other individuals are most interested in the good state of the public roads. The experience which they acquire from a constant personal attention to their own business, their frequent visits on their lines, enables them I think to form a tolerably correct estimate upon that subject; and in the return I allude to, which comprises 908 miles, it would seem that it would not require a greater sum than 33,711*l.* per annum for their maintenance, which averages 37*l.* 2*s.* 6*d.* annually for each mile of road. Those estimates vary according to the local circumstances of the line, from 1*s.*, 1*s.* 8*d.*, 2*s.*, 2*s.* 6*d.*, 3*s.*, 3*s.* 6*d.*, up to as high as 5*s.* the perch, of seven yards, per annum. In addition to the evidence of these persons, I should also mention to the Committee, that the opinions of the different engineers, who for seventeen years past have been employed under the post office Acts, very nearly coincide as to that amount. On this subject, a plan was submitted to the Postmasters General some years back, by captain George Taylor, one of our principal engineers, and brother to the chief engineer; this gentleman is contractor for the line of road from Dublin to Kilkullen. In the proposition that I allude to, Government was informed, that in taking one line of road through the whole kingdom with another, a sum not exceeding 32*l.* each mile per annum, was fully sufficient to maintain the whole roads of the kingdom at the breadth required by the post office Acts; indeed, if I remember rightly, captain Taylor offered to contract for the whole kingdom at that rate himself; and that if he was given a contract for twenty-one years, that he would execute the principal improvements that were still unfinished by the various counties in Ireland.

According to the opinions which you have delivered to the Committee relative to the supervisors, it appears that 1*s.* a mile, which is the maximum that the supervisors can receive under the Act of the 49th of the King, is not sufficient as the average to keep mail-coach roads in repair; are you of opinion that it would be of use to extend the power of grand juries farther in that respect upon mail-coach roads,

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(1 May.)

so as to allow them, according to circumstances, to give a larger sum than 1*s.* a perch in such cases as would require it, to be limited not exceeding what might be thought proper?—I am of opinion that the roads must be much narrower than what the present law requires, to enable them to be kept in sufficient repair at the rate of 1*s.* a perch, and therefore I do think that either the powers of grand juries should in this respect be much enlarged, or a distinct authority established with adequate funds for repairs at all times at command.

Is not the postage upon letters coming from England, and going to the interior of Ireland, higher in respect to the distance to which they are carried, than the postage on letters going directly from Dublin to the interior of Ireland?—The rate is higher; and for this reason, that both in England and in Ireland, when you arrive at a certain distance, the class of postage, in order to be increased, requires a very great distance beyond the rate of that class, for instance, in the English rates, after you pass three hundred miles, it requires an additional hundred miles to authorize an increase of 1*d.* in the tax; applying this to a letter from Dublin to the south of Ireland, the letter comes taxed to Holyhead at 1*s.* two hundred and sixty-five miles; when it gets to Dublin going to Cork, for instance, it goes one hundred and twenty-two miles, and it is chargeable with an increase of 11*d.* to this must be added 2*d.* for crossing the Channel, and 1*d.* for ferry, making the whole charge on a letter from London to Cork, 2*s.* 2*d.*

What is the distance from London to Cork in English miles?—428 miles, exclusive of the Channel.

What would be the charge on a letter going 428 miles from London to any part of England or Scotland?—Fourteen pence.

Allowing then two pence for the passage across the Channel, a letter from Dublin to Cork pays ten pence more according to the distance it goes than it would pay going from London, the same distance in England?—At those rates it does.

Is not it part of the articles of the Act of Union that no duty in Ireland shall be greater upon any matter or thing than it is in England?—It certainly is in the Act of Union.

Has this matter ever been brought under the consideration of the post office in Ireland?—No, not particularly.

Are Irish letters going from Ireland to England subject to the same rates of charge?—They are.

Can you state what is the whole amount of the duties upon the correspondence between England and Ireland?—I should conceive the correspondence between the two countries should amount to 80,000*l.* a year.

Does that include the correspondence from Scotland?—It certainly does, and also by Waterford.

Has it at any former time been of a higher amount?—It certainly has.

How long ago?—I think the highest period was in 1814 and 1815, since which the revenues for the postage in all the three countries have diminished.

Do you conceive the postage is much evaded by sending letters between the two countries by private hands?—We know it is; and at this moment the subject is under the consideration of both post offices.

Do the letters from London to Waterford go by Holyhead or by Milford?—By Milford.

Would not they arrive more regularly if they were sent by Holyhead?—I conceive they would, on many occasions.

What time should a letter that leaves London on Monday night arrive at Waterford in due course by Milford?—A letter leaving London on Monday night reaches Milford on Wednesday morning; it has ninety-two miles water passage, and nine miles land passage in Ireland; it is possible it may reach the same night, but this is a circumstance that can very seldom occur.

Then letters seldom arrive by Milford at Waterford until the Thursday morning?—Scarcely ever, for any effective purpose.

Is the communication by that passage frequently interrupted?—Very rarely indeed, since the improvements of Dunmore Harbour have enabled the packets to remain there. The passages are in winter consequently long, from distance.

What is the average time in performing the voyage?—When I investigated that subject in 1812, I think the average was twenty-two hours, that was before the harbour was improved; at this moment I cannot say.

At what time would a letter that leaves London on Monday night arrive at Waterford, going by Holyhead?—Thursday morning at eleven o'clock.

From

From the regularity with which the steam-packets perform the voyage, is it not nearly a certainty that that would be the time of its arrival?—Certainly.

What is the postage on a letter from London to Waterford by Milford, and on a letter by Holyhead to Waterford?—By Milford, 1 s. 3 d.; by Dublin, 2 s.

Is not there a mail from Bristol to Birmingham every evening?—There is.

Would not letters go more regularly from Bristol even to Waterford by Holyhead and Birmingham than by Milford?—I think as regularly. Bristol is eighty-seven miles from Birmingham; a letter written on Monday evening might reach Waterford by Dublin on Thursday morning; a letter written on Monday evening from Bristol would not reach Milford till Wednesday morning, and would get to Waterford on Thursday also, if the passage should be effected. Bristol is one hundred and fifty-two miles from Milford.

Do not the great improvements making in steam vessels promise to render Holyhead the best line of communication between almost the whole of England and the whole of Ireland?—If the intercourse between the two countries by the two remaining stations for packets now established were to continue as at this moment, I conceive that the correspondence, throughout the year, would be conveyed more regularly and quicker than at present by Holyhead.

Is there any signal gun to assist the packets to enter the harbour at Howth in dark weather?—No.

Have you heard that such a gun has been established at the Stack Rock off Holyhead?—I have only heard it this day.

Would there be any objection or difficulty in having a gun for the same purpose on the pier at Howth, or on some part of Howth Head, to assist the packets in entering the harbour in dark weather?—None, whatever; but I conceive it would be highly desirable.

Have you a copy of a letter addressed by you to the different mail coach contractors in Ireland respecting the condition of their respective lines of road?—I have.

[The witness delivered in the same, which was read, as follows:]

(Copy.)

Sir,

General Post Office, 5th March 1822.

The state of the mail coach roads of Ireland being at present under the consideration of a Special Committee of the House of Commons; and as it is conceived your local knowledge of the line of road for which you have so long contracted to convey the mails, qualifies you to afford useful information on the subject, I am to request you will take the trouble of communicating to me your sentiments, as soon as convenient, on the following points:

1st, What has been the condition of your road generally for the last twelve months, and in what state is it at this moment?

2d, In what state is each particular stage as to surface, exemption from gripes and ditches?

3d, As far as you know, what may be the facility of finding good materials convenient at each stage?

4th, In what manner, as far as you know, are the repairs now made? by what description of persons, generally, are they superintended? and what sum may annually be expended on each mile of road?

5th, What sum annually the perch would you conceive necessary to maintain the entire line, for a period of three or seven years, in the best condition as to surface?

The object of the present parliamentary inquiry being, as far as the P. M. G. understand, to secure the future condition of our public roads in the best and most economical plan, and in order to obtain the most rapid conveyance of the public mails, and ameliorate the general intercourse of the kingdom, I am to beg of you, in addition to the information which these questions have in view, that you will afford me any other suggestions which your own experience and knowledge may give you the advantage of.

(signed) Edward S. Lees, Secretary.

Have you received answers to this letter?—I have; and I have prepared a statement of the substance of the communications I have received in answer.

[The witness delivered in the same, which was read, as follows:]

Sir Edward Lees.

(1 May.)

	State of Road For Twelve Months past.	General State, As to Exemption from Ditches and Gripes.
Road from Dublin to Cork.	Generally in bad repair. For six years past no improvements made further from Dublin than Timolin, thirty miles; some ditches have been filled, and two miles, near Clogheen, have been widened. repair, except three miles near Clogheen, where the ditches are bad; the remainder of the line pretty free from gripes, and from four miles of Cork, passable: breadth of road not more than from sixteen to twenty-one feet, with quick turnings. Road, in general, in bad repair.	From Dublin to Carlow, forty miles, the road is safe as to ditches; the next forty miles very dangerous, and mostly only twelve and thirteen feet wide from ditch to ditch, with sharp hills and quick turnings; six miles near Callan in bad
Dublin to Wexford.	Has been getting daily worse for the last twelve months. Some partial improvements have been made; but, generally speaking, is now in a worse condition than it ever has been hitherto, from sloughs and ruts. Two days rain would render it very bad at any season.	From Bray to Rathdrum there are numerous precipices, without any protection, highly dangerous. All night travelling. Lives have been lost of persons belonging to mail-coach establishment, from the gross neglect of overseers. From Goney to Wexford road, very steep. The entire line from Dublin to Wexford requires improvement, as much as any road in Ireland.
Dublin to Enniskillen.	Thirteen miles of the first twenty-three from Dublin in tolerable good order. It is a turnpike road. The commissioners lately borrowed 6,000<i>l.</i> of government to make four miles; the road is badly made, and is in very bad order. The next seven miles are bad and hilly; a new line necessary; the road funds insufficient to make it. The remaining thirteen miles are wide and good; the next seven miles are presentment road, and except a quarter of a mile, are in good repair. Next division, through Meath and Cavan, very narrow and hilly; an entire new road wanting from Virginia to Cavan, fifteen miles; a new road has been made, but from bad materials, and want of care, is in decay; in a heavy and broken state. Next seven miles, in county Fermanagh, not so bad; materials are better. Remaining seventeen miles, to Enniskillen, in tolerable good order; though subject to floods in winter, is a new road.	Part of this road, through the counties of Meath and Cavan, is both narrow and hilly, and with dangerous ditches on both sides of it.
Dublin to Londonderry.	With the exception of the stage from Ardee to Drogheda, this entire line has been in a very bad state; some parts in a most wretched state, not wide enough for two carriages to pass. Many of the new parts have been badly made, badly bottomed. From Derry to Strabane, made with bad and unbroken material, and no water drains. From Strabane to Newtown, surface bad; bad and unbroken materials. From Newtown to Omagh shamefully bad, and passes over a bog where two carriages cannot pass; the materials bad, and scantily supplied. Omagh to Ballygawly, surface bad; repaired with clay gravel, without care in the selection; coach cannot travel more than four miles an hour; some long and severe hills on this stage. Ballygawly to Aghnacloy is a very hilly stage, but surface good. From thence to Monaghan, line is well chosen, but road bad from hills; and from Monaghan, the entire way to Ardee, (thirty-one miles,) equally bad. From Ardee to Drogheda, road well kept, and, except two miles near Drogheda, in good repair. From Gormanstown to Dublin very bad, and two severe hills.	- - - - -

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Facilities, as to Supply of Materials for Repairs.	Description of Persons employed in, and Average Expense of Repairs.	Average Expense necessary for Repairs, per Perch, per Annum, for Three or Seven Years.
Abounds with lime and with brown stone; both of which material are convenient to both sides of the road.	Generally ignorant persons, who study their own interest more than that of the road. They are termed <i>Road-jobbers</i> , and are paid by the trustees 1 s. each perch of seven yards per annum.	Considers 2 s. 6 d. a perch, per year, sufficient.
Deficient in lime stone; but abounds with material of an excellent quality, with which, under proper care, the road may constantly be kept in good repair.	A presentment road. Applications for presentments of repairs rejected at every assizes, from various causes; frequently from informalities in the applications. The sums that are granted are nevertheless very considerable.	Cannot form an idea what sum would be requisite; but think that, with proper care, and if the public benefit was to take precedence of private speculation, the secret of maintaining the road in the best and most economical repair would be soon ascertained, and the first expense probably the last.
The entire line abounds with good material, except that part of it between Kells and Cavan, in the county of Cavan.	- - - - -	Considers that 5 s. a perch would annually keep it in repair, if made properly, and under proper overseers.
Materials are sufficiently obtained, and convenient to each stage. Some parts afford good lime stone, other parts very good gravel, particularly in the county of Tyrone; and other parts produce good quarry and land stones.	In the county of Derry, the road is well attended to, though at a very high rate; the grand jury never scruple to grant presentments. In the county Tyrone, it is repaired by contract, at 2 s. a perch: considers this a good plan, if proper persons were contractors; but knows of no such persons among those employed. Each contractor has his own friend at the grand jury, who takes care he gets his money at the assizes, no matter how the road is. Through Monaghan, Louth and Meath, it is repaired by presentment, and the road is left entirely to accounting overseers.	Is quite convinced that 2 s. a perch, if fully and fairly expended, is fully sufficient for the repairs for seven years.

Sir Edward Lees.

(1 May.)

	State of Road For Twelve Months past.	General State, As to Exemption from Ditches and Gripes.
Dublin to Galway.	Has been in excellent repair as to surface, except four miles near Galway, which is scarcely passable for a common car, and has always been neglected. The springs of the mail coach are daily breaking though passing at a walk.	The road from Athlone to Ballinasloe, and from Loughrea to Galway, does not exceed in breadth twelve or fourteen feet. It is rather a <i>track way</i> , where in many places two carriages cannot pass, and is surrounded on either side by loose stones, which are constantly falling in, on, and blockading the road. In sundry parts of every stage, in counties Dublin, Kildare, Meath and Galway, dangerous ditches on either side. Between Athlone and Ballinasloe, some very dangerous precipices and no fences.
Ballinasloe to Westport.	The surface of this road has been generally good, but in some parts is rough from badly prepared materials.	On every stage of this road, through the county of Galway to the boundary of Mayo, there are dangerous gripes on both sides; and equally unsafe through county of Mayo to Westport.
Kinnegad to Sligo.	Part of this road has been in excellent condition, but some part also has been in a wretched state. Through county of Leitrim from Rusky, surface smooth, but heavy from bad material. From Drumsna to James Town, county of Roscommon, for twelve months the road very bad, scarcely travelling at a walking pace; from thence to Carrick, so bad, that passengers are obliged to walk, and carriage scarcely, even empty, able to be drawn by the horses from Carrick to Sligo. Boundary road in fair condition, and through that county to the town of Sligo, it has always been well kept.	In the county of Longford from Rathowen very bad road, a very narrow surface and large gripes, with some very dangerous bridges between Edgeworth's Town and Longford.
Dublin to Cashel and Cahir.	Part of this road through the county of Tipperary, and to the bounds of the county of Limerick, has been and is now in bad repair.	From Kilkullen to bounds of county of Kildare, sixteen miles, so narrow in many parts, as not to admit two carriages to pass, with sharp hills, deep gripes, and short turnings. From thence to Cahir, fifty miles, breadth of road from sixteen to twenty-four feet. Two miles not broader than eleven to fourteen feet, with deep gripes on both sides. From bounds of county of Limerick to bridge at Kilworth, ten miles, road is from sixteen to thirty feet wide, with sharp hills, quick turnings, and several gripes.
Cork to Skibbereen.	Two-thirds of this road is in so bad a state, that it is not possible for a mail-coach to travel at the prescribed rate, and the loss in springs and wheels is greater than in any part of Ireland for a similar distance.	From Cork to the point of branch towards Kinsale, very rough. Four miles of the next stage towards Bandon, is in a very deep state. From Bandon to Clonakilty is very deep and full of sloughs; from Clonakilty to Roscarbeg and Skibbereen, in a good state.

Sir Edward Lees.

(1 May.)

Facilities, as to Supply of Materials for Repairs.	Description of Persons employed in, and Average Expense of Repairs.	Average Expense necessary For Repairs, per Perch, per Annum, For Three or Seven Years.
Materials on the entire line, and of good quality, adjacent to the road. Athlone to Ballinasloe is a presentment road, and from Ballinasloe to the county bounds also. The mail-contractor is also road-contractor. Is paid 1s. each perch. Cannot state the sum expended on the part that is turnpike; but the remainder under his care, costs but 16<i>l.</i> a mile per year. The neglected part near to Galway is under no person's care. Except for two or three miles between Castlebar and Westport, good materials are to be had the entire distance, convenient to the road side. From Kinnegad to Longford, materials are good and convenient. From thence to Rusky, not so easily obtained. From Rusky to Drumsna, good materials within a mile or two miles of any part of the line. From thence to Sligo, materials are almost every where convenient. This entire line abounds with lime stone and good brown stone, perfectly convenient to the road. From Cork to Innishannon, materials are indifferent; brown stone and lime stone lie at some little distance. From Innishannon to Bandon, good bank and river gravel. Thence to Clonakilty, bad brown stone and bank gravel; and thence to Skibbereen, good marly gravel; a good material.	From Dublin to Kinnegad is turnpike, and from Kinnegad to Athlone also. The mail-contractor is a trustee. From Presentment road from Ballinasloe, county of Galway, to boundary of Mayo. Mail-contractor is road-contractors, at 1s. a perch. Various contractors have care of the remainder through Mayo, 1s. a perch. From Kinnegad to Mullingar is turnpike; from thence through Westmeath to the bounds of county Longford, is presentment road, and is repaired by supervisors, under 49 Geo. III. The mail-contractor is their deputy, and expends 1s. a perch a year. From thence through county of Longford, it is also managed by supervisors. Through county of Leitrim, it has been sometimes under supervisors, and at other times has been contracted for at 1s. a perch. From Drumsna to James Town, county of Roscommon, it is under no particular care. Between Carrick and the bounds of Sligo, under contractors at 1s. a perch. Through the county of Sligo, it is under the care of sundry gentlemen. The entire road is nearly turnpike, under the control of a Board, who allow a person called a Road-jobber, 1s. a perch a year for its maintenance. A presentment road under supervisors. Expenditure is generally confided to the tenant, or follower of some large landed proprietor, to throw the emolument in his way. The repairs are executed in the most inefficient manner.	2s. 6<i>d.</i> a perch from Dublin to Kinnegad; 1s. 8<i>d.</i> a perch from Kinnegad to Athlone, and 1s. a perch per annum to the boundary of the town of Galway. 2s. 6<i>d.</i> a perch the remaining four miles. Considers 1s. a perch quite sufficient. Considers, that with the exception of fourteen miles from Longford to Drumsna, 1s. a perch is sufficient. Considers 2s. 6<i>d.</i> sufficient. As the repairs in the first year would be very great, thinks that for seven years, 2s. 6<i>d.</i> a perch would be required each year.

Sir Edward Lees.

(1 May.)

	State of Road For Twelve Months past.	General State, As to Exemption from Ditches and Gripes.
Cork to Bantry	This road is in so bad a state for several miles, that the mails are obliged to abandon it, and to take a circuitous route.	Near Bantry, a bridge has been left unfinished, and the occupiers of the adjoining ground have built banks across the different parts of it. From Dunmanway to Bantry, road is good.
Cork to Kinsale.	This road is in a very rough state, but it is free from sloughs.	- - - - -
Cork to Tralee.	This line is rapidly decaying, though it was in good order in the year 1819.	The surface from Killarney is tolerable; but the sides are worn out.
Cork to Killarney.	This entire line has been, for twelve months, in a bad state, and exhibits, at this moment, a perfectly worn out surface. It has been frequently reported to the trustees, who have no influence in making the contractors do their duty.	From Culm to Elm Park, eight miles, surface bad, and road is narrow, with ditches and gripes: is very hilly and circuitous. From Elm Park to Macroom, ten miles and a half, bad, thin surface, owing to bad material used, through parsimony. From Mill-street, three miles, surface tolerably good; but the remainder is bad and narrow.
Cork to Waterford.	That part of the line from Waterford to Youghal is generally in good order; but from thence to Cork, it has been, and is, in a very bad condition. and ditches near the entire stage. Next stage, to Youghal, lately finished, and is in good order. Six miles of the next stage the worst road, without doubt, in Ireland. It was made four years ago, by the <i>organist</i> of the cathedral at Cloyne, and is now in the most disgraceful and dangerous state. Remainder of the stage is very narrow and dangerous, with very deep gripes on both sides; and surface also indifferent. Next stage, to Cork, lately repaired, and is in good order at present; with gripes only on some parts.	From Waterford to Kilmaethomas, road hilly, surface rough; no gripes one half the stage, remainder with gripes, not very deep. Thence to Dungarvon, surface rather better; but gripes and ditches near the entire stage. Next stage, to Youghal, lately finished, and is in good order. Six miles of the next stage the worst road, without doubt, in Ireland. It was made four years ago, by the <i>organist</i> of the cathedral at Cloyne, and is now in the most disgraceful and dangerous state. Remainder of the stage is very narrow and dangerous, with very deep gripes on both sides; and surface also indifferent. Next stage, to Cork, lately repaired, and is in good order at present; with gripes only on some parts.
Belfast to Londonderry.	This entire line, for two years, has been extremely bad, in consequence of the grand jury for county Antrim, through which forty-three miles pass, having dissolved the contracts for repairing, and left the mail coach road totally neglected. It has never since been in order.	Three miles from Belfast to Antrim, road is level and in tolerable good order; the next two miles, one continued ascent of more than one foot rise in eleven of surface; road narrow, with precipices at either side, and generally impassable for mail coaches. From thence to Temple Patrick, road narrow, but is well fenced. From thence to Antrim, four and a half miles, surface good and level. From Antrim to Randalstown, except one mile, road is very bad. To Ballymena, 7 $\frac{1}{2}$ miles, road narrow, without fences; and bogs on either side; with high hills, and rapid descents; mail coach passes at midnight; bridges not sixteen feet wide, and with rapid descents. To Colerain, eighteen miles, road narrow, hilly, and very bad fences. To Newtown, a hilly, mountainous road; surface good.

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(1 May.)

Facilities, as to Supply of Materials for Repairs.	Description of Persons employed in, and Average Expense of Repairs.	Average Expense necessary for Repairs, per Perch, per Annum, for Three or Seven Years.
From Bandon to Dunmanway, material used is a bad brown stone; but good river gravel is convenient. From Dunmanway to Bantry there is blue marly gravel.	A presentment road, under supervisors. Expenditure is generally confided to the tenant, or follower of some large landed proprietor, to throw the emolument in his way. The repairs are executed in the most inefficient manner.	As the repairs in the first year would be very great, thinks that for seven years 2s. 6d. a perch would be required each year.
A slaty stone is mostly used; but field stone and bank gravel are convenient.	- - D ^o - - D ^o - - D ^o -	D ^o - - D ^o - - D ^o
For nine miles there is excellent lime stone, and for five miles excellent blue stone is convenient; but it is not used.	The repairs of the road are contracted for, with farmers, at 1s. 4d. a perch.	Considers 3s. 6d. a perch would be sufficient.
From Culm to Elm Park there is good lime stone, and cheap. From Elm Park to Macroom, six miles, there is also good lime stone; and there is good stone, and screened gravel, to be had the remainder of the distance.	A toll road; is in the hands of poor working farmers, under trustees, who are their landlords; some reside near, and others at a distance from their work. Only work when convenient to them, and often not to be had, when most wanting. There are supervisors over them, who receive salaries of 50 <i>l.</i> from trustees.	Considers 3s. 6d. per perch necessary a year.
Materials are had with ease: lime stone the greater part of the way. The remainder of line there is brown stone, nearly as good; and quarries, almost every where, are open.	Through the county of Waterford road is repaired by farmers, under the trustees, who have contracted for five years, at 24 <i>l.</i> a mile. Through the county of Cork, road is repaired by bailiffs, or working overseers.	Considers that 1s. 8d. sufficient, if fairly expended.
Materials in abundance; chiefly field and quarry stones. From Antrim to Ballymena, good material is scarce and dear; but for the next ten miles, in great plenty; the next eleven miles, to Colerain, not so easily obtained; the next twelve miles, to Newtown, materials in abundance; the next stage, thirteen miles, to Derry, road is level; but for the last year, has been nearly impassable, from bad mode of repairing and bad material. In some part, field or quarry stone not to be had. It is free from gripes; but road very deep.	The persons usually employed as accounting overseers, with few exceptions, are by no means respectable. The presentments may be passed at one assizes. The road is seldom commenced to be repaired, until a month before the next assizes; this is a general practice; in some cases, however, great care is taken of expenditure by country gentlemen, who are grand jurors.	Considers 3s. 9d. or 4s. necessary, per perch.

*Mercurij, 15^o die Maij, 1822.*SIR NICHOLAS C. COLTHURST, BARONET,
IN THE CHAIR.*Sir Edward Lees*, again called in; and Examined.

[THE petition of the inhabitants of Cork, respecting the Mails to and from that City, was read.]

Sir Edward Lees.

(15 May.)

YOU have heard this petition read?—I have.

You are of course acquainted with the arrangements with respect to those coaches?—I am.

Will you state to the Committee how long the second coach has existed, and what was the object of its establishment?—The second establishment between Dublin and Cork has existed thirteen years. In recommending it to government the Postmasters General had two objects in view, first, to extend the benefit of the mail coach system through that very important district of Ireland lying midway between the Cork and Limerick lines of road, passing through the county of Tipperary to the city of Cashel, a district of country to which the Postmaster General had been a considerable time anxious to give the benefit of a mail coach. Its extension from Cashel to Cork was for the purpose of affording an increased acceleration of the English correspondence to that part of the south of Ireland. Those were the immediate objects of that establishment. When I say an increased acceleration of the mails to Cork, it is necessary to apprise the Committee, that at that period the mail coach travelled but at the rate of four miles per hour, consequently, leaving Dublin at eight o'clock at night, the mail did not reach Cork for any purpose of delivery till the second morning after its dispatch from Dublin. In applying this acceleration then to Cork, the advantage to the English mails was this, that the mails from England, which seldom reached Dublin in time for the dispatch from thence at eight o'clock, *p.m.* (but which did reach the post office previous to the dispatch of the second coaches, which took place at two o'clock, *p.m.*) were delivered in Cork a day earlier than they would have been without it, consequently the merchants had an opportunity of replying by the immediate return of post, and thereby saved in their correspondence one entire day. That was the object of the second establishment. Subsequently to that period, the Postmasters General, from the improvements in the roads and other circumstances, were enabled still more to accelerate the mail by that coach to Cork. The time of its dispatch from Dublin was changed from two o'clock mid-day to ten o'clock in the morning, and that change was made from the experience that we had had of the great regularity in the arrival of the mails in England from Dublin earlier than when it was first established. At a still subsequent period the still greater regularity in the arrival of the English mails enabled the Postmasters General to dispatch it at eight o'clock in the morning, therefore the Committee will observe, that the letters, which upon its first establishment did not reach Cork through the medium of this second coach till four o'clock in the afternoon, by this last arrangement were deliverable in Cork as early as ten o'clock in the forenoon. The Committee will observe all these changes were made with reference to the improvements in the intercourse between England and Ireland. Since the establishment of the steam packets, the majority of the English mails have reached Dublin previous to the departure of the inland mails from thence; and therefore, with reference to the original objects of that second establishment, the Postmasters General have found that the second coach became comparatively useless; and in order to render it more available to the public during the remainder of the contract, they conceived it expedient in the course of last season that this coach should be made applicable more to the objects of the Irish correspondence than to those of the English mails. At the period to which I allude, namely, the last season, by the combined arrangements of those two mail coaches the correspondence between the capital and Cork was placed under those circumstances,—the direct mail from Dublin to Cork, which departed at eight o'clock at night, did not reach Cork until half-past ten the following night, therefore it was useless for any delivery whatever. The mail coach which left Dublin at eight o'clock in the morning reached Cork, say at ten o'clock in the morning, nearly as soon as it could be at all serviceable to the merchants or inhabitants of the city; it was an important object therefore, in the judgment of the Postmasters General, to the mercantile interests at Cork, and a very important object for the local circumstances of Kilkenny and Clonmel, that one of those coaches should be so accelerated as to deliver the whole of the correspondence from Dublin, including all the English mails that were found to reach Dublin in time for its dispatch to Cork, the following evening

evening as early as possible; and, therefore, finding they were enabled to make an arrangement with the contractors which cost the public nothing, they entered into a new agreement with them, by which the mail coach should arrive at five the following evening in place of half-past ten at night. This coach carried all the letters that could be written in Dublin to the last moment up to which the public are excluded from writing to every part of Ireland, and all the English mails that came in between half-past two and a quarter before seven o'clock: therefore the Committee will perceive, that although the Postmasters General were obliged, in considering the general interests of the country, to change the regulations of this coach, which in its original extension to Cork was directed solely to English letters, that they did not do so so long as, comparatively speaking, there were any English mails to transmit by it. In the memorial it is stated, that exclusively of the English mails, the merchants at Cork complain that their correspondence with the north of Ireland and with North Britain also suffered a delay in Dublin. It is right to observe, that for the conveyance of the Scotch and northern letters to Cork, there is a direct mail coach that leaves Belfast at such an hour in the morning as enables it to reach Dublin with those mails before seven o'clock in the evening, and that they are immediately transmitted to the south of Ireland by a coach that starts as soon after seven as the mail can be arranged for it. The number of letters from Scotland to the city of Cork, perhaps the Committee will be surprised to hear, does not exceed upon an average six a day; they may be still more surprised to find that those from Belfast are under that average; that the letters from Newry to Cork will not average above twenty-five in a month, and that those from the city of Derry are still fewer; and the Postmasters General, in considering this very limited portion of the correspondence, did not conceive themselves justified in retaining a second coach to Cork for objects exclusively confined to that portion of the correspondence. I have already stated that in the arrangements which have been made, the town of Clonmel had to be particularly considered; for previously to that time, at the rate of travelling which the contractors were bound to observe, the inhabitants of Clonmel had not an opportunity of replying to their correspondents on the same day, for the two coaches between Cork and Dublin nearly met at that place; but the new arrangement, which gives to the city of Cork an increased acceleration of twenty-four hours to all its correspondence, affords to the town of Clonmel a very great advantage. Now, with respect to the second coach that departs at present to Cork, it leaves Dublin at the same hour and reaches Dublin at the same hour that all the other mail coaches do. It goes through a very important part of Ireland, namely, through the centre of the county of Tipperary, which the post office has always considered an object in improving and civilizing that country. It carries all the correspondence from England and from Dublin, for all towns direct passing through Cashel as far as Michelstown, and it carries all the mails to every place to the south-west of Ireland beyond Cork which the Postmasters General could not forward by the coach that leaves Dublin at seven. Upon the subject of this petition, the Postmasters General for a period of nearly six months have had an uninterrupted correspondence with the merchants at Cork, in which their Lordships entered fully into those reasons which obliged them to resort to the measure that I have described. I know their Lordships had the greatest anxiety to accede to the prayer of that petition, and if they could find that any circumstance could authorize them to revive the original hours of travelling under which that coach was conducted, I know they were anxious to do so; but on inquiring into the subject, the Committee will find that if they were to do so, very few objects could be gained by the arrangements, while some of those that we have succeeded in would be defeated, and an increased expense to the public be occasioned. It is evident that so long as the British mails can reach Dublin before seven o'clock at night, that for the conveyance of the British mails a coach leaving Dublin at that hour is of no use whatever to Cork. For the other objects that the petition refers to, namely, the Scotch correspondence and that to the north of Ireland, the Committee will see that the amount is so very trivial, that while any expense would be occasioned to the public by an alteration in the present system, the Postmasters General would not be justified in recommending that that expense should be incurred.

When you say trivial, do you apply it to Derry and Belfast, or to the whole of the north of Ireland?—I mean, North Britain, Belfast, Derry and Newry; if the second coach was to revert to its original hour, we should have to supply an additional number of cross-posts on the same line of road, in order to afford sufficient regularity for the conveyance of the Mails from Dublin to the different towns placed upon that line, because we know from experience already, that those towns would never be satisfied were their letters to be kept over in Dublin from eight

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o'clock at night till eight o'clock the following morning. In the course of the correspondence that has taken place, the Postmasters General have always felt regret that the merchants at Cork have made no direct proposition, by which even that expense, which would amount to about three hundred a year, could possibly be avoided.

That being the principal obstacle to the change?—That is one obstacle among others to the prayer of the petition being complied with.

Do not you conceive, that by the present regulations, Cork has been deprived of the advantages which it possessed under the former one, with respect to the acceleration of her correspondence?—I consider that whatever portion of the correspondence from England does not reach Dublin before seven o'clock in the evening is certainly delayed beyond the time at which it would be received, was this coach to return to its former hours; but upon the other hand, I consider by the plans that have now been adopted, the correspondence from England and from Dublin has been greatly accelerated; for, as I stated before, the mail that was not delivered till the second morning after its dispatch, is now invariably delivered at five o'clock the evening preceding.

Is not that attributable to the arrangement of the steam boats, and not to the circumstance of the change of the coaches?—Not at all; they perform their journey in twenty-two hours instead of twenty-six by this arrangement, connected with the change of coaches; the mails are, with few exceptions, delivered the evening before they could be even under the former plan.

Do not you conceive it possible that some arrangement might be made which would enable the first mail from Dublin to be delivered in Cork at such an hour as would give the merchants an opportunity of answering the letters they received by it before the business hours were over on the same day?—We consider the British mails due in Dublin in the present season at three o'clock in the afternoon; it is quite true, that it would be possible to dispatch the Cork mails, with British letters, and all letters written from Dublin up to three o'clock in the day on either of those roads to Cork, which would have the effect of delivering the letters at Cork at half-past one at noon the following day, provided they went upon the line of road by Clonmel; but if these measures were resorted to, the towns upon that line must either be content to receive no second mail from Dublin, or the public must be similarly situated as in the former case by Cashel, and be at the expense of keeping up a second establishment of cross-posts to them. If it went upon the Cashel line, here again we meet with an obstacle which would debar the merchants of Cork of the benefit which they seek, because that line of road is considerably longer, and the rate of travelling, which the contractor is bound to observe, is not so expeditious.

Could it not be brought by the Cashel line so as not to reach Cork so early as half-past one, but still to reach it within the business hours?—It might be delivered in Cork by this road at three o'clock on the following day, leaving Dublin at three, at the present rate of travelling.

Could it be dispatched from Dublin at three?—Very soon after; ten or fifteen minutes after at latest.

Would it not be possible to alter the departure of one of the mails from Cork to Dublin in a similar manner, so as to prevent the delay which at present occurs, particularly in the northern correspondence?—It would be possible to make the alteration, but the Committee perhaps are not aware that the letters from the south of Ireland for the north are subject to no delay whatever in Dublin, for there is a direct mail coach which starts from Dublin at seven o'clock in the morning for Belfast.

Is it the invariable practice with letters which arrive in Dublin at six o'clock in the morning, to send them off an hour afterwards?—Most assuredly; it is an official arrangement; if they are not sent, those that are in the proper office, are highly reprehensible.

It is stated in the petition that they reached Dublin at seven o'clock in the morning, and rest in the post office there till seven in the evening?—I do not understand that it is so; if it is so, the postmasters and myself are ignorant of it. The advantage of that coach consists in its immediate departure for the north after the arrival of the mails from the south.

The Committee are to understand that if that be the case it can be regulated?—No doubt of it; and must be so.

Do not you think that some arrangement, such as is suggested, can be made in the dispatch of the mails both from Cork and Dublin, so as to restore to the merchants at Cork nearly the same advantages they possessed before?—Yes; there are two arrangements, by either of which the people of Cork would experience some advantage, either by making one of those coaches depart immediately after the arrival

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of the English mail or at seven o'clock on the following morning. If the contractors choose so to accelerate their movement upon the Cashel road, that their coach would reach Cork by six o'clock the following morning, and that they would indemnify the public against the increased charge for supplying the towns upon the Cashel road with additional cross-posts, another and a very material obstacle that has influenced the Postmasters General would certainly be removed. But here again the Postmasters General would naturally ask, what benefit to the correspondence or to the commercial interests of any part of Ireland would be afforded? If, as a measure of personal convenience to Cork, such an arrangement could be made, and that no expense was incurred, and that no mails were to be delayed, I dare say the Postmasters General would have great pleasure in complying with the wishes of the inhabitants of Cork; but with the exception of a very few English mails this coach would convey but a very small portion of the correspondence; but still, as the contract is in force, and will be for eight or nine years, if the merchants of Cork could exercise their influence and overcome those difficulties, which are the only ones that I am aware of, I do think their petition would be much more likely to succeed than under the present obstacles.

The Committee are to understand that the main difficulty is the expense attendant upon the establishment of cross-posts?—That is one difficulty; the other difficulty is, that, unless the contractors so accelerate their movement as would ensure the arrival of that coach in Cork at six o'clock the following morning, all the correspondence for all places beyond Cork, including four or five different lines of road, would be detained twenty-four hours at Cork.

If the other difficulties were removed, and the merchants at Cork still wished to have the convenience of this coach, which is a great convenience to them, unless the contractor would bring in that coach in time to meet the dispatch, those mails would lie in Cork till the next day?—Yes.

What are the objections to the other arrangement proposed; namely, that the coach should leave Dublin as soon after the arrival of the English mails as possible, so as to arrive at Cork at business hours on the Cashel line of road?—The only difficulty is, the supply of those cross-posts.

Is there another mail on the Cashel line of road besides that?—Not now.

Would it not be an inconvenience to every other place on that road, if it was dispatched before seven o'clock in the evening?—It certainly would, as I have stated.

With respect to the dispatch of the mails from Cork to Dublin, one at present starts at half-after four, the other at six, and, consequently, one, as far as Cork is concerned, is perfectly useless, what would be the objection to any alteration in that?—That arrangement, of course, would be liable to the same objection that I have already stated with reference to the Down mail, being still obliged to preserve the expense of the cross-post.

You mentioned, that one of the objections to altering the time of the departure of the second coach, arises from the expense the post office would be put to in establishing the different cross-posts, because the different towns, the delivery of whose letters would be changed, would complain of that inconvenience?—Yes.

Are the letters from the north, destined for Cork, detained any time, and what time, in Dublin?—All letters from the Derry line of road remain from six in the morning till seven in the evening, thirteen hours, liable to the same delay that every part of Ireland experiences, from every place from whence the letters pass through the capital, with the exception of the road from Belfast. All letters that are received from the Belfast road, by the evening mail, are dispatched in an hour after their arrival, by means of this second mail coach, which the post office has the benefit of, without any expense whatever to the public: the contractors convey the mail gratis, for the honour of the appellation of a mail coach.

What, are the letters from the north, or from any part of Ireland, destined for Cork, that are detained in Dublin?—All letters from the Londonderry line of road, and from the Galway and the Sligo lines of road, remain thirteen hours in Dublin.

You have mentioned to the Committee a great number of letters that pass from Derry, Belfast and Newry, and other towns in the north, do you mean to say, that is the only correspondence between Cork and the north; is there no other communication with the north but through Dublin?—None.

Are you aware that there is any considerable correspondence between Cork and Scotland?—The correspondence from Scotland to Cork I think would not amount to seven letters a day.

Is not the correspondence between Cork and Belfast, for instance, much more at particular

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particular seasons than at others; you are speaking of the average number of letters, is there not at particular seasons of the year a very great correspondence between Cork and Belfast?—I am not aware that there is any part of the year when it is greater than another; I can submit to the Committee the exact number each day for the last fortnight.

You are aware that the two coaches from Cork to Dublin arrive in Dublin nearly at the same moment?—I am.

Do they not arrive in Cork nearly at the same moment?—Not at all; one I think arrives at five and the other at half past nine, P.M.

The earliest arrives at five?—Yes.

What is the earliest departure from Cork after the arrival of that coach from Dublin?—One departs at half past four in the morning by the Cashel line of road, that by Clonmel at six.

Has the merchant any opportunity of answering his letters that arrive by the second coach which arrives in the evening?—The Cork merchant can receive nothing from Dublin by the second coach.

From other parts of Ireland?—Yes.

He cannot answer them till the next morning?—Certainly not.

Are you aware that after five o'clock in the evening any letters that arrive even by the first mail coach arrive too late to answer them any time in the morning?—Certainly not; I conceive the Cork merchant has in many cases as much time as the capital of Ireland has for its correspondence with England, because we do not deliver our mails the second day till after five o'clock in *Dublin*.

Are you aware at what time the merchants of Cork assemble as such in order to transact business and to carry on their mercantile transactions amongst each other?—I am not.

Should it appear that it was their invariable practice to cease to do business amongst each other as merchants, at or before five o'clock, would you then say that they could as such answer by any morning's mail the letters of business that they receive through the first mail which arrives at five o'clock, after they have broken up?—They certainly could not answer, because as it is supposed that they have closed their mercantile transactions, it is very evident that they could not answer any thing connected with those transactions; but they can answer letters they have received from Dublin, respecting and in reference to those transactions which may have been previously discussed on 'change.

Should the merchant have no opportunity of answering his letters received either by the five o'clock or nine o'clock mail on the following morning, what is the earliest opportunity he has to answer such letters?—I cannot admit that the merchant has not ample time to answer his letters from six o'clock in the afternoon till six o'clock the following morning, because, if I admit that, I must admit all the labours and exertions of this Committee for the whole of Ireland, particularly with respect to Dublin, are in every way perfectly useless. This Committee is labouring to bring the mails in Dublin, so that they may be delivered in Dublin to the merchant even as late as five o'clock in the afternoon; and therefore I consider that the Cork merchant is equally well off as the merchant at Dublin, who considers himself much benefited, though having but from five to ten P.M. to answer.

Do not you consider expedition a most material advantage in all commercial transactions?—Most assuredly; and it is the point which the post office in Ireland has been labouring at for twenty years, and which they have succeeded in obtaining to a considerable though not to the greatest extent.

Are you of opinion that the merchant who receives his letters at six o'clock, when he has seldom any opportunity of consulting his fellow merchants, can answer his letters respecting his mercantile concerns with the same advantage to himself as if from the arrival of the mail at an earlier hour he had had an opportunity of consulting with his fellow merchants?—The merchant certainly must correspond with much more effect to himself if he could receive his letters previous to the hour of meeting his fellow merchants on 'change.

Supposing the English mail to arrive in Dublin at ten o'clock in the morning, which now arrives at three in the afternoon, would the post office be disposed immediately to expedite one mail to Cork?—In that case it is impossible to say what arrangements the Postmasters General might not think it necessary to make, not only for the Cork mails but for various other mails, so as to meet so valuable an arrival as that certainly would be; it might be a question even whether the entire system of our dispatch from Dublin might not be rendered subject to very great changes, perhaps even the general system of dispatch altogether broken up, and that the particular

mails

mails should be dispatched at particular times in the day in place of all being at present subject to one dispatch; a measure of that description would certainly depend upon the individual value of the correspondence of each particular line of road and its local circumstances, and in this respect Cork would certainly stand most conspicuous.

You have stated that letters destined from Cork from some parts of the north and other parts of Ireland are detained thirteen hours in the Dublin post office, are you aware that the Cork merchant adds to that another grievance, namely, that the letters which he receives from Dublin are useless to him for seventeen hours, that is, that he has not an opportunity of answering them from Cork until seventeen hours after the receipt of them; and, if so, would you not consider that as a great commercial grievance for the second city in Ireland?—I consider that in that respect, whatever grievance the merchants of Cork must feel, it is not greater than is felt by every other part of Ireland, and by every place in England whose correspondence is liable to the same detention in the general post office in Lombard-street.

If Cork has cause to complain of considerable delay in the delivery of letters, what remedy would you on the part of the post office suggest to do away that grievance?—In order to enable the post office to relieve the merchants at Cork I would get rid of the expense of those posts, and prevail upon the contractor to expedite his rate of travelling to Cork.

Have the merchants the power to interfere with the contractor's agreement with the post office, and do you mean to say that they are only to be relieved from a grievance which they consider as a public one, at a certain expense to be imposed upon themselves as merchants?—I consider that, as far as the correspondence of Cork is concerned, and this is the only question that the Postmasters General can legitimately consider, the merchants at Cork are subject to no inconvenience the removal of which should be defrayed by the post office revenue; and I do think that the merchants possess considerable influence over those contractors.

More than the post office?—Much more; I consider it more a measure between the contractor and the people of Cork.

Will you explain in what way?—In removing one of those obstacles that I have already alluded to, in expediting the mail coach sufficiently early to ensure the dispatch of all the cross mails in the morning. I consider that the contractor would be greatly benefited, and the people of Cork inconvenienced as passengers, so much so, that by Clonmel the mail ought to travel in twenty-one hours, and by Cashel in twenty-two hours.

Do you conceive that the merchants at Cork have the power of regulating the hour of the dispatch of the mail coaches from Cork?—I do not consider that they have the power of regulating the hour of dispatch or arrival, but I consider that they possess such influence over the contractor, by the consideration of passengers, that they could oblige the contractor to travel at that rate which would enable the Postmasters General themselves so to regulate the arrival and departure as would secure the object of that petition if the other difficulties were removed in regard to expense.

Are not the contractors bound to the post office to deliver the letters in Dublin within a certain time of their departure from Cork?—Precisely so.

Before the post office enter into any such contract, do not the Postmasters General ascertain at what rate the contractor ought to carry his mail, and do they not bind him to what they conceive a fair and proper time, as between him and the public?—The contract is either made at a certain rate of travelling per hour, or the entire distance by the contract is provided for within a certain number of hours. In the present case I think the time between Dublin and Cork by the Cashel line of road is twenty-four hours.

Within how much shorter time could the mail be conveyed between Cork and Dublin than the time at present allowed to such coach?—I think if the road by Cashel was in a more improved state than the contractor represents it to be, the mail might travel very nearly as quick as that on the Clonmel road which goes in twenty-two hours.

You think the mail by Cashel might be made to arrive two hours earlier?—Yes.

How much earlier might the Clonmel mail be made to arrive?—One hour.

Even in the present state of the road?—I think it is practicable on the Clonmel road to go in twenty-one hours.

The mail by Cashel leaves Cork at half past four?—It does.

Veneris, 17^e die Maij, 1822.

William Crockett, Esq. called in; and Examined.

W. Crockett, Esq.

(17 May.)

WHAT is the opinion of the general mercantile body of Cork on the late change of mail coaches?—That it is highly detrimental to their interests.

Can you from your own knowledge state whether any inconvenience has been sustained from the present arrangement?—I can speak to very great inconveniences.

Will you state particulars?—That the northern correspondence and the Scottish correspondence also is delayed for twelve hours in Dublin, and at the hour at which it arrives in Cork it is of comparatively very little value to the mercantile interests, inasmuch as it may be said to lie dormant for fifteen hours longer.

Has it not come to your own knowledge that there has been a great delay in the receipt of English mails under the present arrangement?—In some instances it has come to my knowledge.

What delay do you mean?—A delay of twelve hours at least.

That delay has been occasioned by the arrival of the English mail in Dublin after the two coaches have left it?—Precisely so.

Do not you consider the correspondence between Cork and the north of Ireland and Scotland of great importance?—I know it to be of very great importance at certain seasons.

Does the average daily account of the correspondence between Scotland and the north of Ireland and Cork, give a fair idea of the importance and extent of such correspondence?—I conceive it certainly does not.

Will you state the reason?—Because I know that there is considerable intercourse between Scotland and Cork at particular seasons, and also between Cork and the north of Ireland.

You say that your letters remain dormant for fifteen hours, that is, fifteen hours before you can consult with your brother merchants?—Yes, precisely so; fifteen hours at least.

How many hours elapse before you can answer those letters after the necessary communication with your fellow merchants takes place upon the subject of them?—Thirty-six hours.

Are you aware of any arrangement that the merchants could make with the mail coach contractors, by which the inconvenience of the hour of departure could be remedied?—Not at all; I am not aware of any.

Do you know at what time of the year the correspondence between Cork and Belfast and Cork and Scotland is most extensive?—I should think the winter and spring; the latter end and commencement of the year.

Sir Anthony Perrier, called in; and Examined.

Sir A. Perrier.

ARE you a merchant in the city of Cork?—I am.

What are the inconveniences sustained by the merchants of Cork, by the present arrangement of the arrival and departure of the mail?—The merchants have not sufficient time to communicate with each other to reply to their correspondence by return of post.

Do you consider a delay of thirty-six hours material in mercantile transactions?—Surely,

Very material?—Yes.

At what hour do the mails leave Cork at present in the morning?—One I think at half-past four and the other at six.

If the half-past four o'clock coach were to depart two hours later, namely, at half-past six, would that be any material convenience to the merchants?—None at all.

If the six o'clock coach were to leave at seven, would that be any material convenience?—None at all.

Will you state generally to the Committee what are the inconveniences that the merchants sustain?—The hours of business in Cork are from nine o'clock in the morning till five, and if the coach would arrive at any time in the morning, so as to enable the merchants to get their letters by nine o'clock, they could do their business and return an answer the same day, as was the case when the coach left Dublin at eight. It would not answer the purpose to arrive an hour earlier. I do not say it would be of no use, because it may be of some little use, but it would not answer the purpose of the merchants of Cork.

Are

Are you aware that the generality of the mails from Scotland reach Belfast after the departure of the mail coach for Dublin, and before the departure of the early mail from Belfast for Dublin, which reaches Dublin at seven o'clock P.M.?—Yes.

Sir A. Perrier.

(17 May.)

Sir Edward Lees, called in; and Examined.

IS not one of the reasons given by you for the refusal to change the hour of the Cashel coach to Cork in the morning, that the letters to towns beyond Cork would be delayed?—It is one.

Sir Edward Lees.

Does not one coach now leave Dublin at seven, and the other at eight, and if persons writing to places beyond Cork put in their letters by six o'clock P.M. would any delay of their letters be thus avoided?—Most assuredly; for all put in as late as six o'clock or before seven would be delayed for places beyond Cork.

Then in fact the only delay that would occur if the coach went in the morning would be those which now have an opportunity of being put in between six and eight in the evening?—I do not think the Committee exactly understand the point: Under the present regulations no part of the mails even to places beyond Cork are excluded beyond the regular time, nor is the Cork mail coach by Clonmel in fact dispatched, according to the post office interpretation of dispatch, a moment sooner than it formerly was; but the reason of that coach leaving the post office first is, by reason of the attention of the officers in the sorting room being confined to the making up of the Cork bag. The towns beyond Cork are therefore held over till that bag is completed, and the coach departs then with the Cork bag, and the bag for Clonmel and Kilkenny.

By what coach now do the letters for the towns beyond Cork go?—They go by the coach that passes through Cashel, and which is also dispatched as soon after seven o'clock as those mails can be completed.

If one evening coach be still left, could not the letters for the towns beyond Cork go equally by that conveyance, and as fast as they do now?—I should recommend one of those coaches instead of leaving the post office at eight to be kept back till half-past ten, and then the object would be quite answered as far as regards British mails, for scarcely one would be left behind in the year.

What time would that arrive in Cork?—That would arrive in Cork at half-past ten o'clock at night, and might reach it at half-past eight.

If the letters for the towns beyond Cork, sent by the mail which now leaves the post office that starts at eight, were to be transferred to the coach that starts at seven, and that that coach was not to start until eight, then would not the letters for the towns beyond Cork be conveyed equally expeditious as the post office wishes?—They certainly might, but in doing that the principal object of the whole arrangement of the post office would be defeated, namely, the early delivery of the letters from Dublin in Cork. They would not be delivered there until one hour after the present time; and a still greater injury would be inflicted upon the town of Clonmel, by curtailing a considerable portion of the short time now allowed to that town for answering its letters to the capital, therefore, unless either by an encouragement to the contractor from the post office, or by the influence of the inhabitants of Cork, through the medium of passengers, the contractor himself were to accelerate his movement upon the Clonmel road, which I think he might do by one or two hours, the present arrangement with the post office would certainly be defeated, as far as regards Cork and Clonmel.

How as far as regards Cork?—Because now the letters are delivered at five o'clock, then they would not be delivered till six.

Another of your objections to such an alteration is, that the letters to towns between Dublin and Cork upon the Cashel line would be delayed?—Were the Cashel coach to leave Dublin at eight in the morning in place of eight o'clock at night, those mails would either be delayed, or we must provide an additional cross-post for them.

What are those towns?—All the towns direct from Naas to Fermoy, with all the cross branches depending upon them.

Is there any place of commercial consequence?—Cashel is the principal place and Tipperary. The arrangements which now regulate the mails from Waterford to Limerick passing through Cahir might be disturbed.

Do you consider that all the places on that line would require cross-posts if the change proposed were made?—Certainly; there is no other means of providing for them.

Sir Edward Lees.

(17 May.)

Can you state what would be the expense of those cross-posts?—I should think the amount would not be above 300*l.* a year.

If a private arrangement were made by which the expense of those cross-posts would be defrayed, would not the Postmasters General be disposed to waive the other objections and to yield to the present request?—I am not aware of any other difficulty except the delay of the cross mails beyond Cork, and the danger of passing through the county of Tipperary during night-time.

For what period are the contracts made for the mail coaches on the Cashel and Clonmel lines of road to Cork?—There is a residue of about nine years of twenty-one, for which period those contracts were made.

Can you afford the Committee any information with respect to the mileage expense of those lines?—In order to afford the Committee a correct view of the charge upon the post-office revenue for the establishment under its present consideration, I must very shortly enter into a detail of the circumstances with reference to its original creation. As I stated before, the great object of this coach was to open for the first time an important district of country to the benefit of the mail coach system.

Which line is that?—The Cashel line. It was therefore as much for the general improvement of the country as for any other consideration that that contract was made. If the Postmasters General had confined their views to the mere subject of post office revenue, probably, not only that contract, but very few mail coach contracts would have been made in Ireland. They have always considered for the last twenty years, that situated as Ireland was, with very limited means of intercourse by public carriage, and in many parts unprovided with public roads, that although the post office revenue was likely to become subject to considerable expense arising from those improvements, that the general interest of the country and its general revenues, together with the whole of its landed interest and wealth were more particularly concerned, and that those revenues became benefited in a much greater proportion than the post office revenue suffered. So long ago as the year 1791, the Postmasters General entered into a contract for the mail coach from Dublin to Limerick, and in that contract it was provided, that if in the interim the expense of the Cork line, the Belfast line, and the Derry line, which then cost the public at the rate of 9*d.* a mile for the conveyance of the mail, should be reduced, that in the same proportion should the mileage for the conveyance of the Limerick mail be reduced. I mention this circumstance, because it directly bears upon the expense of the establishment under the consideration of the Committee. In the year 1807 the Belfast contract had expired, and the Postmasters General looking at a reduction in the Limerick contract naturally insisted upon a reduction in the Belfast mileage. The contractor refused; the mail coaches were laid down between Dublin and Belfast for a period of nearly six months. At this period, a proposition was made for a contract between Dublin and Cork by Cashel, with which was coupled a proposal to re-establish the Belfast mail coach at the rate which the post office required, namely, 6*d.* a mile; the contract also that was in force between Dublin and Cork by Clonmel was then 9*d.* a mile, it of course became an object with the post office also to reduce that mileage, still keeping in view the means it would afford of reducing the mileage to Limerick; a contract was then made, by which a reduction to Belfast was effected, amounting to about 313*l.* a year. The saving in the contract between Dublin and Cork by Clonmel, amounted to about 450*l.* a year. Shortly afterwards the Postmasters General, by an arrangement they made with the contractor to Derry, reduced his mileage to a similar standard, by which an expense amounting to 450*l.* a year additional was also saved. So soon as those several contracts came into operation at the reduced rate, they had the direct effect which the Postmasters General had looked to with reference to Limerick, and an additional charge of about 370*l.* per annum was saved to the post office in the Limerick mileage. By the whole of this measure the amount of saving was about 1,583*l.* per annum in mileage. The expense of the coach between Dublin and Cork by Cashel, as to mileage, amounts to about 1,470*l.* to the best of my recollection, so that the Committee will perceive, that while we have provided an establishment through that important district, and have been extending its benefits through the medium of the acceleration of the British mails to Cork during so important a period, reductions exceeding the amount of its mileage have actually been effected; and exclusively of that, the Committee will further bear in view, that by the increased acceleration of the British mails to Cork, the Cork merchants have always preferred receiving their correspondence from London and the

the north parts of England by Dublin, in lieu of its former route by Waterford, in consequence of which the post office revenue has, from that period, been in the receipt of 3*d.* upon each letter more than they would receive by the Waterford passage.

Sir Edward Lees.

(17 May.)

Mercurii, 22^a die Maij, 1822.

SIR HENRY PARNELL, BARONET,

IN THE CHAIR.

Lord Viscount Forbes, a Member of the Committee, Examined.

CAN you give the Committee any information on the state of the mail-coach road from Dublin to Sligo?—Yes; the road is in excellent order, but the rate at which the mail travels is very slow.

Lord
Viscount Forbes.

(22 May.)

How many miles an hour?—The mail leaves Dublin at eight in the evening, and does not reach Longford until a quarter past eight next morning, a distance of only fifty-eight miles. Another objection is, that the Sligo mail is carried by the same coach which conveys the Galway mail, only as far as Kinnegad, from thence to Mullingar, a distance of ten miles. A diligence, holding only three people, runs; and if there are six people in the mail, three of them of course must remain there; because there are places only for three in this diligence.

At what hour does the mail arrive at Kinnegad from Dublin?—I believe about half past one in the morning. It is very desirable that the Sligo mail should be conveyed in the same manner as the Galway mail is conveyed, by one coach, and not by the intervention of the diligence.

How is the mail conveyed beyond Mullingar to Sligo?—In a regular mail coach.

Then there is a diligence only from Kinnegad to Mullingar?—From Kinnegad to Mullingar.

Supposing the coach from Sligo comes full to Mullingar, part of the passengers must be left behind, from the diligence not being large enough to carry them?—Yes.

Is this line of road a line of general and important communication?—It is the great western road of Ireland, passing through Mullingar, Longford, Carrick-on-Shannon, and many other important towns.

Might not a better road be taken from Dublin to Mullingar than that through Kinnegad, which is the common road to Sligo and Galway?—I should think not; because it is I believe almost perfectly straight, and without many hills.

Do you not conceive that the mail might travel along that road a great deal faster than it does at present with equal facility?—Decidedly, because it is impossible to have a finer road.

Under whose management is that line of road?—It varies in the different counties.

Is there much under turnpike trustees?—That part which is in the county of Dublin is, and part in the county of Kildare, some in Westmeath, but not any in Longford, it is managed in Longford by the county.

Then it is kept in repair in the other counties by grand juries?—Yes.

What method do the grand juries pursue with respect to repairs?—I can only answer for Longford, where we have contracted at so much a perch; I believe a shilling a perch for seven years after having put the road in repair for the whole line. I think the contract for conveying the mail to Longford from Dublin is not well performed; the price of conveyance is very high, and not compensated for either by expedition or convenience.

In what manner have you bound the contractor, so as to make sure of his faithfully discharging his engagements?—By placing supervisors over them, to whom they are to give sufficient security for the performance of their duty, and we found the system answer extremely well in the county of Longford.

Do you not conceive that the mail might travel with the greatest ease at the rate of six miles an hour?—Decidedly, because it is as good as any road in the world.

Is the road safe from dangerous pits and ditches?—Generally so, I should say, certainly.

Dominick Browne, Esq. a Member of the Committee, Examined.

*D. Browne, Esq.
M. P.*

(22 May.)

CAN you give the Committee any information respecting the road from Dublin to Galway?—I know it very well as far as Ballinasloe, seventy-two miles.

What is the condition of it with respect to repair?—It is in a very good state.

What description of road is it as to its general direction and as to hills?—I understand that it is extremely circuitous to Athlone, as there might be a road made to Dublin from Athlone, nearly ten miles shorter than the present road. The road is also three or four miles longer than necessary, between Athlone and Ballinasloe, the present distance being twelve miles, and a proper road, if made, would not be more than seven or eight.

At what rate does the Galway mail travel?—Within these last two months the rate has been accelerated from five miles an hour to five miles and a half; but the branch mail, which runs between Ballinasloe and Westport still continues at the rate of five miles an hour.

Might not the mail in both cases go faster with perfect safety and ease to the horses?—I am certain it could; for it is a common thing in the different stages to find the coach going at an extremely slow rate, and when the coachman is asked why he goes so slow, he answers that he must not be in before his time. There is no difficulty in the mail going much faster, as the whole road is made of broken lime stone, and in perfectly good order.

Sabbati, 1^o die Junij, 1822.

Mr. Peter Purcell, called in; and Examined.

Mr. P. Purcell.

(1 June.)

ARE you one of the contractors for the mail coach from Cork to Dublin by Cashel?—I am.

Have you read the evidence which Sir Edward Lees has given before this Committee?—I have.

What mode would you suggest to remove the objections made by Sir Edward Lees, as to the sought for change of hours of dispatch from Dublin of the Cashel mail coach, in consequence particularly of the increased expense of between two and three hundred a year for the additional cross posts?—I would suggest that the expense of these cross posts should be met by reducing the post office guards altogether; and that in lieu of them, as this coach would then be only an auxiliary mail to Cork; and but seldom carry any but the Northern mails, the guards should in future be provided by the contractors, thereby making a considerable saving to Government, beyond the increased expense they would be put to by the cross posts. That the guards should be provided in the same manner as on the Belfast line on the day mail, where the contractors have provided the guards for upwards of six years at their own expense, both as to wages and clothing; they are sworn in at the post office in the same manner as their own servants; and there has been scarcely any one instance of neglect or misconduct by those men so appointed by the contractors.

How can the inconvenience be obviated that must follow the change of hours of dispatch and arrival in Cork of this coach, so far as regards the out bound mails from Cork to Kerry, Skibbereen, &c. which now leave Cork at six A.M.?—By accelerating this Cashel mail, so as to arrive in Cork in twenty-four hours instead of twenty-six, and that the hour of arrival in the morning in Cork should be so as to enable those coaches to be dispatched at seven instead of six, thereby making a delay only of one hour in the dispatch of those coaches.

Would not that be productive of delay in their arrival at the places?—It would; but not of such delay as would in any case prevent the answering of letters within the twenty-four hours.

Could you bring the Cashel mail to Cork in sufficient time to have the out bound mails dispatched at the same hour in the morning as they are now?—No doubt I could, if there was a sufficient compensation given for the accelerated pace.

Can you expedite the Clonmel mail coach one hour, as suggested by Sir Edward Lees?—Not without considerably increased expense, in the present very imperfect state of the roads.

APPENDIX.

Appendix, No. 1.

SURVEYS and Re-surveys of Roads under Warrants of the Postmaster General; with a Statement of the Amount of the Estimates for improving the several Lines of Post Roads in Ireland; also, an Account of the Expense incurred in making Surveys and Re-surveys, and of Salaries or other Payments to Surveyors, under the Acts 45 & 46 Geo. III.; together with a Return of the Number of Mail Coaches in Ireland.

(N° 1.)—SURVEYS under Warrants of the POSTMASTERS GENERAL

TITLE OF SURVEY.	AMOUNT of ESTIMATE.	In the COUNTIES of	OBSERVATIONS.
	£. s. d.		
Antrim to Newry - - -	23,682 - 10 ½	Antrim, Down and Armagh.	Survey under consideration of grand juries.
Ardee to Carrickmacross -	7,012 7 6	Louth and Monaghan.	For particulars see page 48, under the head Re-survey, (N° 2.)
Belfast to Londonderry -	46,100 4 3	Antrim and Londonderry.	Approved, and made in many parts. The mail coach travels this line.
- - to Lisburn - - -	10,146 19 8 ½	Antrim & Down	Approved; road made.
- - to Newtownards - -	3,919 10 4	Down - - -	See (N° 2.) page 49 (under the head Re-survey).
- - to Bridge - - -	64,926 8 -	Antrim & Down	Consideration postponed by both grand juries.
Bandon to Bantry - - -	23,512 8 6	Cork - - -	Approved; road made.
Ballymena to Randalstown -	9,176 4 -	Antrim - - -	Under consideration of the grand jury.
Ballinasloe to Westport -	40,679 17 -	Galway & Mayo	Approved of in Galway, and partially carried into effect; but not under the post road acts of 45th or 46th Geo. 3. Postponed in Mayo.
Boyle to Ballina, by Lough Talt	24,679 16 5	Roscommon, Mayo and Sligo.	Postponed by Roscommon and Mayo grand juries, and rejected by Sligo grand jury, as only on the borders of their county.
- - - - - by Ballaghadi- reen and Foxford.	33,324 14 3	Roscommon, Mayo and Sligo.	Ditto - - - ditto - - - ditto.
Cork to Cove, so far as Dunkettle Bridge, including the New Bridge.	13,280 14 2	Cork - - -	Consideration postponed, till the debt due for Treasury advances shall be liquidated.
- - - - - by Balvalley Bridge and Marino.	50,459 6 10	Ditto - - -	Ditto - - - ditto - - - ditto.
- - - - - South of Marino -	47,335 14 -	Ditto - - -	Ditto - - - ditto - - - ditto.
- - - - - Skibbereen - - -	28,154 1 7	Ditto - - -	Road made. See (N° 3.) page 53, and page 62.
Cork to the Town of Kinsale -	12,881 6 1	Ditto - - -	Road executed.
D° - to D° - by another line -	11,656 9 6	Ditto - - -	} See (N° 2.) page 49, for particulars, being rather under the description Re-survey.
D° - to D° - by another line -	8,340 17 -	Ditto - - -	
Cork to Youghal - - -	17,186 15 11 ½	Ditto - - -	Whole line approved; but made in part only, from Killaleigh to Youghal, which was the worst part of the road.
- - to Waterford, two lines -	84,859 - 4 ½	Cork and Waterford.	Neither line of road yet determined on by these grand juries.
- - Limerick - - -	35,908 9 -	Cork and Limerick.	Road executed, almost this entire line; and the mail coach travels on it. A turnpike.
Clane to Tullamore - - -	22,897 2 10	Kildare and King's county.	Consideration postponed by both grand juries.
Carrick-on-Suir, towards Waterford	1,373 18 6	Kilkenny -	Road executed.
Caher to Mitchelstown, by Burns- court.	10,479 - 2	Tipperary, Li- merick & Cork.	Road executed in Tipperary and Cork; postponed in Limerick by grand jury.
D° - to D° - by Clogheen and Ballyporcen.	11,018 7 11	Tipperary and Cork.	Rejected in both counties by the grand juries.
Castle Oliver to Mitchelstown -	7,674 8 -	Limerick & Cork	Postponed in both counties by the grand juries.
Clane to Ballingar - - -	18,700 - -	Kildare, King's county, and Roscommon.	Postponed in these three counties by the grand juries.
Curragha to Slane - - -	5,948 4 6	Meath - - -	Postponed by trustees. A turnpike road.
Caher to Cashel - - -	5,093 - -	Tipperary -	Approved, and partly executed.
- - to Tipperary - - -	10,557 11 -	- Ditto -	Ditto - - ditto - - ditto.
- - to Clonmel - - -	5,877 6 6	- Ditto -	Ditto - - ditto - - ditto.

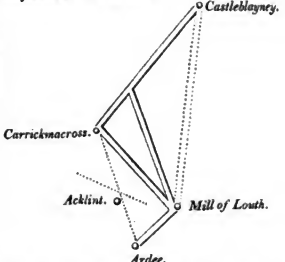
TITLE OF SURVEY.	AMOUNT of ESTIMATE.			In the COUNTIES of	OBSERVATIONS.
	£.	s.	d.		
Caledon to Aughnacloy - -	6,041	16	1	Tyrone - -	See (N ^o 2,) page 49. for particulars (under the head Re-survey.)
Dublin to Carlow, by Baltinglass	129	7	2	Carlow - -	Falls into the Castledermot turnpike road. Not executed.
- - to Enniskillen, S.W. of Lough Erne.	24,812	6	—	Dublin, Cavan and Fermanagh.	A portion of this line and estimate is in the next item. Another line.
- - to Enniskillen, partly another line.	54,880	13	—	Dublin, Meath, Cavan and Fermanagh.	Rejected in Dublin and Meath; approved of in Cavan and Fermanagh. Road so far made.
- - to Galway - - -	47,673	3	7	Dublin, Meath, Westmeath, Roscommon & Galway.	Turnpike road. Rejected in Dublin and Meath; approved and partly executed in Galway and Westmeath; approved but not presented for in Roscommon. A portion of the Mullingar turnpike road.
- - to Ratoath and Curraghna	10,465	7	2	Dublin & Meath	Turnpike. Executed in Curraghna.
- - to Ringsend and Pigeon House.	1,434	14	—	Dublin - -	Executed when the Holyhead packets were stationed at the Pigeon House.
- - to Howth - - -	6,747	—	—	Ditto - - -	Rejected. See (N ^o 3,) page 53.
- - - - - another line	4,000	—	—	Ditto - - -	Executed. See (N ^o 3,) page 53.
- - to Lucan - - -	3,494	5	—	Ditto - - -	Turnpike. Approved by trustees, but not executed.
- - to Wexford - - -	50,453	5	1½	Dublin, Wicklow and Wexford.	Road partly executed in Dublin and Wexford; completed in Wicklow. Some very dangerous steepes remain in Wexford.
- - to Drogheda - - -	19,518	2	5	Dublin, Meath and town of Drogheda.	Rejected. A new line has been made from Finglass to join the Duleek line, but not under the post-road acts.
- - towards Bray (re-survey) part only.	2,448	13	9½	Dublin - -	See (N ^o 2,) page 50.
- - to Waterford, by Baltinglass.	57,137	12	—	Dublin, Wicklow, Carlow and Wexford.	Postponed in Dublin in part, and road made in part. Road made through Wicklow, and making through Carlow and Wexford.
- - to Slane - - -	6,718	3	6	Dublin & Meath	Executed in Dublin, and mostly so in Meath.
- - to Cork, part only -	4,088	17	3	Dublin & Carlow	Road executed in Dublin, and postponed in Carlow.
- - to Crumlin, by Parnel Bridge.	3,544	13	10	Dublin - -	Partly made.
- - to Brittas - - -	3,850	—	—	Ditto - - -	This line not yet decided on by the county grand jury.
- - to Arklow, part only -	500	—	—	Wicklow - -	See (N ^o 2,) page 50, (under the head Re-survey.)
Drogheda to Donaghadee -	38,131	15	2	(Town of) Drogheda, Louth, Armagh and Down.	Turnpike road to Lisburn in Down; rejected in Drogheda; approved and partly made in Louth, Armagh and Down. Remainder of line not a turnpike; approved by grand jury of Down, and partly executed.
- - - to Londonderry -	59,109	12	5½	(Town of) Drogheda, Louth, Monaghan, Tyrone and Londonderry.	Line approved the whole extent; and, except in Drogheda, mostly made. See (N ^o 2,) pages 48, 49, 51, 52.
Dungarvan to Youghal - -	64,116	2	6	Waterford and Cork.	Postponed in Cork; approved of by Waterford grand jury.
Ennis to Currofin - - -	8,182	18	—	Clare - - -	Consideration postponed by grand jury.
- - to Kilrush - - -	19,259	11	6	Ditto - - -	Approved. See (N ^o 2,) pages 50, 51, (under the head Re-survey.)
Fermoy to Middleton - -	10,580	—	—	Cork - - -	Approved. Road executed.
- - to Limerick, by Bruff -	26,797	3	6	Cork and Limerick.	Postponed in Cork; approved, and greater part executed in Limerick.
Gort to Crusheen - - -	1,376	12	8	Galway & Clare	Approved, and road executed.
- - to Loughrea - - -	7,294	17	—	Galway - - -	Postponed by the grand jury.
Kilcullen Green to Kilkenny	18,472	18	—	Kildare, Queen's county and Kilkenny.	Postponed in Kildare. Road executed in Queen's county and Kilkenny.
Kilcock towards Kinnegad	2,300	—	—	Kildare - -	Road executed. A turnpike. See (N ^o 2,) p. 51. (Re-survey.)

TITLE OF SURVEY.	AMOUNT of ESTIMATE.	In the COUNTIES of	OBSERVATIONS.
Kilkenny to Cork, by Nine Mile House.	£. s. d. 36,051 16 6	Kilkenny, Tipperary, Waterford and Cork.	Road executed in Kilkenny, partly in Tipperary and Cork, and approved of throughout.
- - - - - by Slieve-naman.	19,828 5 6	Kilkenny and Tipperary.	No decision by the grand juries.
Kinnegad to Rooskey Bridge -	26,100 — —	Westmeath, Longford and Leitrim.	Approved throughout: the line partly executed in Westmeath and Longford.
Leighlin Bridge to Waterford, by Gore's Bridge and Graig-ummana.	24,098 19 9	Carlow, Kilkenny & Wexford.	Consideration postponed throughout.
Limerick to Galway - -	38,172 2 5	Limerick, Clare and Galway.	Approved of throughout the line, and partly executed in Clare and Galway.
- - - to Gort - - -	20,407 18 —	- - Ditto -	Postponed in Limerick, executed in Clare, and partly so in Galway.
- - - to Tralee, by Adair and Rathkeale.	35,945 17 6	Limerick and Kerry.	Postponed in Limerick, executed in Kerry.—See (N° 3.) p. 54.
- - - - - by Askeaton and Tarbert.	40,633 9 2	- - Ditto -	Executed in Limerick.—See (N° 3.) p. 54.
Londonderry to Buncrana -	7,100 — —	Londonderry and Donegal.	Approved of in Londonderry.—Survey not complete in Donegal.
Loughrea to Oranmore - -	6,348 2 —	Galway - -	Consideration postponed by grand jury.
Longford Bridge - - -	1,200 — —	Longford - -	Repairs only in part executed.
Mitchelstown to Fermoy -	3,162 1 —	Cork - - -	Road executed.
Mullingar to French Park, by Ballymahon.	24,039 6 —½	Westmeath, Longford and Roscommon.	Consideration postponed in the three counties.
- - - - - by Longford	18,133 — 11	Westmeath, Longford and Roscommon.	Consideration postponed in Westmeath, approved of in Longford and Roscommon.
Newry to Colerain - - -	62,291 4 6	Armagh, Tyrone and Londonderry.	Consideration postponed throughout.
- - - to Downpatrick - -	18,695 15 —	Armagh and Down.	- Ditto - - ditto - ditto.
Naas to Cashel - - -	32,183 — 6	Kildare, Queen's county, Kilkenny & Tipperary.	Consideration postponed throughout the line.
- - - to Castledurrow - -	11,175 7 —	Kildare and Queen's county.	- Ditto - - ditto - - ditto.
Redchair to Fermoy - -	7,173 15 6	Cork - - -	- Ditto - - ditto - - ditto.
Royal Oak to Waterford, by Thomastown.	18,641 11 2	Carlow and Kilkenny.	This is a branch from the Dublin and Cork road, and was not adopted.—For the approved line between Dublin and Waterford, see (N° 2.) p. 50, (Re-survey), and (N° 2.) p. 52.
Rooskey Bridge to Sligo - -	14,081 10 3	Longford, Leitrim, Roscommon and Sligo.	Executed in Longford, partly approved in Leitrim, and approved of in Roscommon.
Strabane to Londonderry, west of the river Foyle.	17,473 18 5	Tyrone, Donegal & Londonderry.	Rejected throughout, in consequence of the rebuilding of the bridge of Derry, the post road being on the east of the Foyle river.
Tallagh to Youghal - -	18,731 6 1	Cork and Waterford.	Line approved throughout, and presented in Waterford.
Thomastown to New Ross -	18,097 — 7½	Kilkenny and Wexford.	Postponed in both counties.
Tralee to Killarney - - -	10,612 2 —	Kerry - -	Road made.—See (N° 3.) p. 54.
Tipperary to Cloanmel, by Cashel - - - - - by Fethard, towards Waterford and Limerick.	14,817 13 — 10,489 4 —	Tipperary - - Ditto -	Consideration postponed. - Ditto - ditto.
Waterford to Limerick - -	52,143 14 4	Waterford, Kilkenny, Tipperary & Limerick.	Postponed in Kilkenny, approved of and mostly executed in Tipperary, and altogether so in Limerick.
- - - to Passage - - -	1,143 1 1½	Waterford -	An off-branch from the line from Waterford to Dunmore Packet Harbour approved, but not executed.
- - - to Dunmore Packet Harbour.	6,269 12 5	Waterford, city & county.	Executed throughout the line.

April 1st, 1828.

Alex Taylor.

(N^o 2.)—RE-SURVEYS made at the request of GRAND JURIES or TRUSTEES.

TITLE OF RE-SURVEY.	AMOUNT of ESTIMATE.	In the COUNTIES of	OBSERVATIONS.
Ardee to Carrickmacross, by the Ford of Acklint - - - -	£. s. d.	M. f. p.	The present distance, by the old road, between Ardee and Carrickmacross is 11 miles; the distance, by the re-survey, 9 miles 5 furlongs 19 perches. It is by far the best line, most level, and the cheapest that could be chosen, and would have been selected on the original survey, if it had been intended to recommend the Derry mail to be sent through Carrickmacross.—The design was to retain and improve the old road so far as the Mill of Louth, and by making a new line from thence to Castleblayney, to shorten the distance between Ardee and Castleblayney nearly 3 miles, as the subjoined sketch will show. 
	1,677 14 —	Louth . 6 0 0	
	6,148 1 10	Monaghan 3 5 19	
	7,825 15 10	miles 9 5 19	on the line between Drogheda and Londonderry.

The dotted line between Mill of Louth and Castleblayney is the proposed new design, as it was intended to leave out Carrickmacross, which is the present mail coach road between Ardee and Castleblayney.—The single dotted line between Ardee and Carrickmacross, is the re-survey by Acklint.—See Re-survey, Mill of Louth to Castleblayney, page 52.

But the grand juries of Louth and Monaghan preferred retaining Carrickmacross on the Derry mail line, and at their request the re-survey by Acklint was made, which, together with the original survey, was submitted to both grand juries, pursuant to the statute, who jointly approved of it and presented it to be the line of mail coach road.

At the subsequent assizes, the grand jury of Louth rescinded their presentment, and adopted the old road, which they retained although 1 mile 2 furlongs 21 perches longer than the re-survey, and they expended on it nearly the amount of the estimate of the new line: however, it is well executed.

This inconsistency of the grand jury was complained of to the court by the surveyor who attended on behalf of the postmasters general; the judges remonstrated with them on the breach of faith, in the first place, with the postmasters general, who had incurred the cost of the re-survey at their solicitation, and also of serving the notices, pursuant to the statute, on the holders of ground in both counties through which the new road was to pass, which persons had gone to the expense of traversing for damages, and had as good reason to complain.—The court also said it was a disappointment to the Monaghan grand jury, who had presented the continuation of the line on the faith of the presentment made by the grand jury of Louth, and had actually raised money for that purpose; but the Louth grand jury refused to assign any reason for the rejection of the line which they had adopted the preceding assizes, and pleaded their authority and absolute right to do so under the post road act of 46 Geo. 3, p. 143, which the court admitted.

TITLE OF RE-SURVEY.	AMOUNT of ESTIMATE.	In the COUNTIES of	OBSERVATIONS.
Aughnacloy to Omagh, by Augher.	£. s. d. 16,102 8 5	M. f. p. 15 1 17 Tyrone, on the line between Drogheda and Londonderry.	This line was originally ordered to be surveyed by the postmasters general, to take in the town of Augher, and very convenient also to Clogher, about two miles distant; it is the best, most level and direct line of road, and the shortest; besides, it would open a great extent of country under the Slabay mountain, through which no road has yet been made; but the grand jury disapproved of it, and adopted the present line by Ballygawly, on the direct survey, which, though longer, yet required considerably less expense (about one half) to widen it, and make a few departures from it, to avoid the hills, the estimate being 8,823 <i>l.</i> 1 <i>s.</i> 11½ <i>d.</i> and the distance 16 miles, 2 furlongs and 38 perches. The design on the map between Augher and Omagh, marked with a yellow shade, is 12 miles and 2 furlongs in length, and the estimate for making it amounts to 10,777 <i>l.</i> 10 <i>s.</i> 11 <i>d.</i> It was made at the request of the grand jury; but it is not so good a line or so cheap as the route contained in the above distance of 15 miles, 1 furlong, 17 perches, which is distinguished on the map by a red line.
Arklow to Wexford, on the line between Dublin and Wexford.	4,958 15 3	Wexford - -	This re-survey was made at the request of the grand jury of Wexford; the distance is about 6½ miles, and embraces part of the original survey. The road is executed, and the mail coach travels on it.
Belfast to Newtownards - -	3,919 10 4	Down - - -	Re-surveyed at the request of the grand jury, and this line was approved of.
Caledon to Aughnacloy - -	- - -	Tyrone - - -	The original design is marked by a red shade on the map; the estimate amounts to 6,041 <i>l.</i> 6 <i>s.</i> 1 <i>d.</i> ; the distance 6 miles and 8 perches; the three occasional deviations were re-surveyed as indispensable on retaining any part of the present road.
	1,185 4 6	Green line 1 1 6	
	3,907 - -	Yellow 3 4 12	
	1,697 4 1	Purple 2 7 38	This re-survey was made at the request of the grand jury of the county of Tyrone, forwarded to the postmasters general by the earl Caledon, who took much interest in this line.
			The designs, together with the original survey, were submitted to the grand jury, who approved of part of it only; viz. the green and purple shades; but they postponed presenting for it until they had liquidated more considerably their debt to the Treasury for advances on the Derry mail coach road, passing through this county.
Carrickmacross to Monaghan by Ballybay.	14,460 17 10	Monaghan, on the line between Drogheda and Londonderry.	This re-survey was made at the request of the grand jury of Monaghan and the linen merchants of that county, to accommodate the linen trade on this line, which is very considerable; and should the Derry mail be continued through Carrickmacross, the route should be Drogheda, Ardee, Carrickmacross, Ballybay, Monaghan, and from thence by the present improved line to Londonderry.—The Armagh mail, in such case, would pass through Castleblayney; and its projected route is detailed in Re-survey, Mill of Louth to Castleblayney. See p. 53.
Castleblayney to Monaghan -	13,500 - -	Ditto -	This re-survey was made at the request of the grand jury, as being in the most direct line between the two towns; but no line could be selected within the standard prescribed in the post road acts, of 1 foot in a length of 35 feet rise and fall, without extending the distance to a great length, and at an enormous expense. The postmasters general did not defray the cost of this survey.
Cork to Kinsale - - -	11,636 9 6	Cork - - -	This re-survey was made at the request of the grand jury of the county of Cork.—Is about 12 miles in length.
	8,340 17 -	Ditto - - -	Is about 4 miles in length.—These two lines were requested by the grand jury of Cork, before they would take the original survey into consideration.—A portion of these two lines, and also of the original survey, now forms the new road.—Executed.

TITLE OF RE-SURVEY.	AMOUNT of ESTIMATE.	In the COUNTIES of	OBSERVATIONS.
Drogheda towards Collon - -	£. s. d. 237 18 -	County of the town of Drogheda.	This re-survey is less than one mile. Departing north of Drogheda, the design formed the letter Y, branching N. E. towards Collon, and N. W. towards Dundalk, and would have been a great improvement to both roads, making a wide avenue into the town, free of the wretched cabins, which are a great obstruction. So far a re-survey of the Drogheda and Derry line, made at the request of Dunleer turnpike board and grand jury of Drogheda. Two other designs to avoid Loughbay Hill are shown on the map; the yellow one 256 perches long, amount 483 l.; and the other, which is green, 270 perches, amount 487 l. 16 s. 6 d.
Dublin to Arklow - - -	500 - - -	Wicklow - -	This re-survey, which is but (occasionally) a deviation from the original survey, was made at the request of the grand jury of Wicklow; it is contiguous to the town of Arklow, and is about four miles in length; and the road has been made accordingly.
Dublin towards Bray, by Stillorgan and Cabinteely.	2,448 13 9	Dublin - - -	This was made at the request of the grand jury of the county of Dublin; is about four miles in length in two places; that part only was adopted near Cabinteely, amount 371 l. 2 s. 1 d., which was presented for by the grand jury.
Dublin to Lucan - - -	3,494 5 -	Ditto - - -	This re-survey was made at the request of the trustees of the Mullingar turnpike road, and of several landed proprietors, who promised, if it should be adopted, there should be no damages sought for the value of the land. The survey was laid before a full meeting of the trustees, who approved of it, and promised to make it the line, if the grand jury of the county would present it to be the post road; but it was afterwards postponed by the grand jury.—No money was raised. This line, if adopted, would be a considerable improvement, avoiding several dangerous steepes.
- - to Slane - - -	347 8 -	Meath - - -	This re-survey was made at the request of the grand jury of the county of Meath; it is about five miles in length; but it has not been adopted. The original survey has been preferred, and the road made.
- - to Waterford, through Balinglass.	57,137 12 -	Dublin, Wicklow, Carlow and Wexford.	This cannot be strictly called a re-survey, it is rather a second line to Waterford, embracing an extent of country which would be most materially benefited by a mail coach road, and ought to be opened, even though there was another line of road improved to Waterford.—The grand juries of Wicklow, Carlow and Wexford were unanimous for it. The line has been presented, and the road nearly completed through Wicklow, above twenty miles in length, and in progress through the other counties south of Wicklow.—The small portion of this line, which passes through the county of Dublin to the junction of Wicklow county at Tallagh Hill, has not yet been completed, but is in progress. See No. 1, p. 46.
Kanis to Kilrush, by Loughnaneena.	23,931 5 9 23,555 4 11	Clare Greenline on the map Yellow ditto -	M. f. p. 42 feet wide, 21 1 11. Ditto 52 feet wide, 18,674 18 3 - - - - 21 0 36. - - - - 18,555 4 9 This re-survey was ordered at the request of the grand jury of Clare; it is evidently the cheapest and shortest line between the extreme post towns, but does not accommodate any other post town throughout the line; it passes through a very remote part of the county, and where few or any of gentry reside. The lower line, by the Shannon, was preferred by the postmasters general, as accommodating the post towns of Kildysart and Knock in its progress, and was adopted and presented for by the grand jury; but a traverse was laid against it by some gentlemen of the jury, who opposed it, on the plea of its not being the shortest and cheapest line. The particulars of the original survey are detailed in the next item, for the information of the Committee, to show the difficulties to be encountered by the postmasters general in getting a presentment for a road where conflicting interests on grand juries cannot be reconciled,

TITLE OF RESURVEY.		AMOUNT of ESTIMATE.	In the COUNTIES of	OBSERVATIONS.
		£. s. d.		
Original Survey.	Ennis to Kilrush by Kildysart and Knock.	- - -	Clare	reconciled, to carry the requisite measures into effect. The traverse was defended on the part of the Post Office by advice of counsel, but by consent of parties was postponed, and not since tried, and, it is presumed, has fallen a dead letter; yet the money has not since been raised; and it was agreed by the grand jury that the greater part of the original survey by the Shannon line should stand, and that a few small deviations should be adopted when re-surveyed, and estimated for; and for which the postmasters general issued their warrant, on the solicitation of the grand jury and of several great landed proprietors. The re-survey was in progress, but was ordered by the postmasters general to have its completion postponed, but there is no doubt it will be adopted when it comes before the grand jury.
		23,336 5 6	Red line on the map	42 feet wide, 23 4 20. Ditto 32 feet wide, 19,259 11 6
		24,044 1 3	Green - - -	- - - 24 7 0 - - - 21,011 14 0
		24,872 14 10	Red and purple	- - - 24 6 10 - - - 20,636 8 10
		24,524 4 2	Green & purple	- - - 25 1 10 - - - 20,565 9 0
Although four lines appear as the original survey by the above estimates, yet two lines only were surveyed, as shown on the map, viz. the red and the green lines, as the act directs, where demesne grounds interfere. The mixture of shades, such as green and purple, and red and purple, are only small deviations occasionally along the principal lines, to avoid plantations. The two estimates were calculated at the request of the grand jury, and it was considered by them that a road 32 feet wide would be sufficient, and would meet less opposition, in its completion, with future grand juries, than a road 42 feet wide, which latter only is contemplated and provided for by the post road acts of the 45th and 46th Geo. III. This is the line as explained in the preceding item which was presented for, but not until an alteration of a small portion of the road was re-surveyed to avoid demesne ground, the property of Mr. M ^c Donald, through which it passed, who availed himself of the power granted by the act of the 46th Geo. III, in opposing the proposed improvements. Under such circumstances the particulars of this re-survey are detailed in the next item.				
Ennis to Kildysart - - -		8,901 10 4	Clare - - -	32 feet wide all new road 10 3 34 by the red line on the map.
		8,830 10 6	- - - - -	- - - - - 9 4 30 - green.
		1,899 - 4	- - - - -	- part only new road 1 7 36 - yellow.
		3,221 12 8	- - - - -	- - - - - 7 2 21 - purple.
		This is only a portion of a re-survey upon the original survey between Ennis and Kilrush, as described in last item; it is very inconsiderable in length. There was little expense attending it, on the part of the postmasters general, which was principally only the calculation of the difference in the estimates between the width of the road 42 feet and 32 feet, and was ordered at the request of the grand jury.		
When the line to which all parties on the grand jury have assented, shall be finished, it will no doubt be promptly executed, and will pass through the towns of Kildysart and Knock.				
No country requires an improved line of road more than this, and the mails are at present conveyed over great and dangerous steeps, the surface of it in the worst repair, and altogether impassable by a coach.				
Kilcock towards Kiunegad -	2,300 - -	Kildare - -	This re-survey was made at the request of the trustees of the Mullingar turnpike road; it is about four miles in length, and was made for the amount of the estimate, at the expense of the trustees.	
Londonderry towards Belfast -	8,634 8 1	Londonderry, on the line between Londonderry and Belfast.	This re-survey was made at the request of the grand jury; the design is on the verge of the river; the banks are composed of a rabbit sand; the great expense would be in building a wall along the river side to support the road. The design was rejected in consequence of the great expense attending it, which was unavoidable. The upper line has been improved, and the mails travel on it with security.	

(continued)

TITLE OF RE-SURVEY.	AMOUNT of ESTIMATE.	In the COUNTIES of	OBSERVATIONS.
Mill of Louth to Castleblaney -	£. s. d. - - - 1,677 14 - 6,148 1 10	Louth and Monaghan. M. f. p. Louth 2 7 2 Monaghan 9 5 20 miles 12 4 22 on the line be- tween Drogheda and Derry.	This may be termed a re-survey, though instructions were given by the postmasters general that this line should be surveyed at the issue of the original warrant for the line between Drogheda and Derry. It makes a saving of more than two miles and a half to Castleblaney, independent of two miles more being saved by leaving out Carrickmacross; but it was not adopted by the grand jury of Monaghan. No doubt it will be the line to Armagh, as it is the most favourable that could be chosen; and by making a new road in part from Carrickmacross to Ballybay, and thence to Monaghan, this latter line would serve a great portion of manufacturing country in the linen trade, and be the great line to Londonderry, as explained in Re-survey, Ardee to Carrickmacross, page 48. There is a favourable line for a road from Castleblaney to Armagh by Keady. The Armagh mail coach should in this case travel from Dublin to Slane, Collon, Mill of Louth, Castleblaney, Keady and Armagh.
Newtown Stewart to Strabane on the western side of the river Mourne.	- - - 7,519 14 3	Tyrone - - 7m. 3f. 24p.	These two lines were re-surveyed at the request of the grand jury of Tyrone; they had not the advantages of the original survey on the eastern side of the Mourne, which was in length six miles, four furlongs, and twenty-nine perches.
Ditto to ditto, crossing the Mourne at Camus.	9,194 17 10	6m. 5f. 35p. on the line between Drogheda and Londonderry.	
Omagh, in the town of - - -	937 16 4	Tyrone 1f. 12p. on the line between Drogheda and Londonderry.	This improvement avoids the great hill in this town, through which the mail coach is obliged to travel, and is exceedingly dangerous. This design was surveyed at the request of the grand jury; it is a perfect level line along the bank of the river, and terminates near the gaol on the road to Newtown Stewart. It was approved of by the grand jury, and will be presented for, as the owner of the ground will be amply benefited by opening this new street, and no damages will be granted.
Royal Oak towards Waterford -	3,500 - -	Kilkenny - -	This re-survey was made at the request of the grand jury of the city of Waterford, and of the Chamber of Commerce at Waterford, as the other line was rejected by the grand jury of Kilkenny in consequence of the expense, which in the county of Kilkenny exceeded 15,000 <i>l.</i> but embraced about fifteen miles of new line, a small portion, between three and four miles in length, between Mullinavat and Thomastown, to avoid the great steep in the old road. This improvement has been made, and the coach travels on it at present, but the materials are very indifferent along the line. This line since the alteration has been made, is now part of the turnpike road between Royal Oak and Waterford, but was made at the expense of the county, as the tolls would not afford the cost. The road leading from the metropolis to Waterford skirts the county of Kilkenny for a great length, which is a bar to its improvement; as the Waterford traders only frequent this line, the grand jury of Kilkenny object presenting for it, as of no benefit to their county; and by the present road laws, the grand jury of Waterford cannot present for it, being out of their jurisdiction.
Strabane to Londonderry - -	17,473 18 5	Tyrone, Donegal and Londonderry, on the line between Drogheda and Londonderry.	This re-survey was made by order of the postmasters general, in consequence of the destruction of the Derry bridge by the ice in the winter of 1814, and the mail being nearly lost in a ferry boat, and when it was not certain that the bridge would be rebuilt. It is thirteen miles in length, but rejected by the grand jury of Donegal. This re-survey was approved of by government.

(N° 3.)—RE-SURVEYS by Order of the LORD LIEUTENANT.

TITLE OF RE-SURVEY.	AMOUNT of ESTIMATE.	In the COUNTIES of	OBSERVATIONS.
Cork to Skibbereen	£. s. d. 12,939 1 7	Cork	Re-surveyed in order to ascertain the deviations from the original survey, which were considerable; and also to connect the valuation of the expenditure on the whole line. The original survey and estimate for this road were made by Mr. Larkin, which latter being 25,128<i>l.</i> 17<i>s.</i> was presented by the grand jury, and advanced by government. The acting general overseer reported to the grand jury, at a subsequent assizes, that this sum had been expended, and was insufficient to complete the road, which would require 9,000<i>l.</i> in addition. This latter sum was also presented for and advanced by government. It was again reported to the grand jury, at another subsequent assizes, by the same general overseer, that having also expended this sum, he found it would require a still further sum of 12,000<i>l.</i> which they presented accordingly, and applied to government for its advance. From the excess of presentments required for this road beyond the original estimate, government thought proper to withhold this last sum until an investigation should be made into the expenditure, which was ordered accordingly; and that it should be ascertained, whether it had been occasioned by deviations from the original survey, or mismanagement, or otherwise. Major Taylor and Sir Charles Coote were directed to make this inquiry; and as they found the road in various states of progress, and the deviations from the original survey numerous, they judged it necessary to make a complete re-survey and measurement of the line as it then stood. They reported that the value of the expenditure upon the entire line amounted only to 16,264<i>l.</i> 4<i>s.</i> 6½<i>d.</i> although the general overseer had alledged to have previously expended 34,128<i>l.</i> 17<i>s.</i> the amount of the two first presentments. They also made an estimate of the sum requisite for the completion of the road, which amounted to 12,939<i>l.</i> 1<i>s.</i> 7<i>d.</i> which the grand jury presented for; it was advanced by government, and for this sum the road has since been completed. The reporters, by order of Mr. Peel, made a full statement to government of their inquiry, of all deviations and the state of the works generally, on this line of road. For further particulars of this re-survey, see p. 63.
Dublin to Howth	4,000 — —	Dublin	The original survey was designed to pass through very valuable ground; the amount of the estimate was 6,747<i>l.</i>; the survey was approved of by the Malahide turnpike board, and a jury empanelled to value the ground, who found for the traversers to the amount of 25<i>l.</i> per acre, which would have amounted to some thousand pounds, and the grand jury of the county of Dublin refused to present for the amount of the verdict. A new line was proposed, the principal part of it skirting the shore, the estimate for which was only 4,000<i>l.</i> and the damages were estimated at 1,000<i>l.</i> for the value of the land. An act of parliament was passed for the purpose of adopting it as the post road, and 2,000<i>l.</i> was granted by this act as the maximum to be raised off the county of Dublin, to pay the value of the ground through which the road was to pass; the damages were rated at 1,200<i>l.</i> only, and the road was made for the amount of the estimate. A sloping fence of dry stone will be required to preserve the road from being undermined by the sea, and a parapet wall on the top of it for the protection of passengers, carriages, &c. for a length of about two miles from the commencement of the shore line, to its termination at the offset to Sutton, near the Warren House, a distance of about two and a half miles in length. This sloping stone fence and parapet will cost about 2,000<i>l.</i>; it is now indispensable for the protection of the road, which has been undermined along the shore by persons removing the gravel bank which supported it, otherwise it would not have been necessary.

TITLE OF RE-SURVEY.	AMOUNT of ESTIMATE.	In the COUNTIES of	OBSERVATIONS.
Tarbert to Tralee - - -	£. s. d. 10,997 4 —	Kerry, on the line between Limerick and Tralee.	This was a re-survey and valuation, similar to that from Cork to Skibbereen, and was ordered by government at the request of the grand jury. The original survey on the line between Limerick and Tralee, of which this is a part, was made by Mr. Larkin, the estimate of which, in this country, amounted to 16,179<i>l.</i> 4<i>s.</i> 6<i>d.</i> which was presented for and alledged to have been expended, as also several other additional sums. The whole of the sums alledged to have been expended exceeding the original estimate, amounts to 10,309<i>l.</i> 7<i>s.</i> 7<i>d.</i> and 10,997<i>l.</i> 4<i>s.</i> as above; the amount of my (Sir C. Coote's) estimate was required to complete the road nearly five years ago, and was at that time altogether impassable for carriages; the small quantity of materials, which was applied very injudiciously before draining the road, were then worn away.—This is the great circuit road between Limerick and Tralee; and in consequence of being left unfinished, the judges have been obliged to travel from Limerick to Cork, and from thence to Tralee, a round of about 60 miles. A presentment for this estimate of mine (Sir C. Coote) of 10,997<i>l.</i> 4<i>s.</i> at Spring 1817, and re-presented the Summer following for the like sum, but government refused to advance the money until a proper experienced person, to be approved of by government, should be contracted with to make the road, or to superintend the expenditure.—See report and valuation respecting this road, delivered to government after Summer 1817, p. 73.—The amount of the original estimate was advanced by government. No steps were taken by the grand jury to complete this road for two years after this above presentment was made, and in the mean time the new road, though in an unfinished state, was in constant use, and became considerably worn, but it has since been taken in hand by a contractor, who required and obtained a higher estimate for the intermediate wear and tear, of about 1,000<i>l.</i>—The work is in progress.
Tralee to Killarney - - -	4,489 16 6	Kerry - - -	This was a similar re-survey, estimate, and valuation, as from Cork to Skibbereen, and was also ordered by government, and submitted with a full report.—The original survey was made by Mr. Larkin, the estimate of which amounted to 10,612<i>l.</i> 2<i>s.</i> and was presented to be raised, and general overseers appointed to make the road, and were empowered to draw the money from the county treasurer, to whom it was advanced by government: above 1,800<i>l.</i> was afterwards presented for this line, upon the request of the general overseers, and again 1,469<i>l.</i> 17<i>s.</i> 7<i>d.</i> making in all 13,881<i>l.</i> 19<i>s.</i> 7<i>d.</i> but I (Sir Charles Coote) found no more value on the entire line than 7,506<i>l.</i> 2<i>s.</i> 8<i>d.</i> If the amount of the sum which I estimated to complete the road be added to the alledged expenditure, it will appear above 10,000<i>l.</i> is lost to the county. The road was capitally made, and for the amount of my estimate; but is now in want of repair. The re-survey was little more than a measurement of the new road to ascertain what the expenditure had been, and a valuation thereof, and what sum would be required to complete the road.

April 1st, 1822.

Alexander Taylor.

(N° 4).—ABSTRACT of Estimates furnished to GRAND JURIES.

COUNTY.	AMOUNT of ESTIMATE.			SUMS PRESENTED.			OBSERVATIONS.
	£.	s.	d.	£.	s.	d.	
Antrim - - - - -	82,384	17	7½	10,146	19	8½	The postmasters general have not cognizance of any further sums having been presented in the several counties; nor are they by law armed with the power to ascertain the amount of presentments made by grand juries; and they have not any control or management of the money presented. Presentments to a considerable amount have no doubt been made besides those contained herein. It is presumed the secretaries to the grand juries and treasurers of counties can give the necessary information; and the return from the treasury of sums advanced to county treasurers under the post road act, will give all the information requisite, where the money has been applied under the post road acts of 45 and 46 of Geo. III.; but grand juries have presented large sums for improving and repairing post roads under the general post road act of 36 Geo. III. of which the treasury could not have cognizance, as the money was raised off the county in the usual way. For the above reasons the post masters general cannot say what presentments were rejected, as their surveyors have not attended grand juries under the post road act of the 36 Geo. III.
Armagh - - - - -	23,468	9	5½	—	—	—	
Cavan - - - - -	26,156	7	6	23,080	—	—	
Cork - - - - -	416,811	16	4	177,800	15	7½	
Carlow - - - - -	27,460	2	1	—	—	—	
Clare - - - - -	66,187	19	4	19,896	11	6	
Dublin - - - - -	66,493	17	—	21,309	3	6½	
Down - - - - -	86,175	19	5	19,500	—	—	
Drogheda (town) - - - - -	424	1	3	—	—	—	
Donegal - - - - -	13,540	16	5	—	—	—	
Fermanagh - - - - -	35,300	—	—	36,500	—	—	
Galway - - - - -	70,515	14	7	4,152	11	2	
Kildare - - - - -	65,815	12	1	—	—	—	
King's County - - - - -	16,458	13	4	—	—	—	
Kilkenny - - - - -	87,488	16	4	11,650	13	11	
Kerry - - - - -	51,657	16	8	76,234	1	10½	
Limerick - - - - -	95,139	8	2	47,605	13	2	
Louth - - - - -	20,490	3	4	12,838	2	6	
Leitrim - - - - -	8,302	5	4	—	—	—	
Longford - - - - -	20,913	18	4½	4,318	7	—	
Londonderry - - - - -	68,606	1	11	10,000	—	—	
Meath - - - - -	40,572	15	3	9,585	2	2	
Monaghan - - - - -	24,394	1	11½	21,812	15	11½	
Mayo - - - - -	49,196	10	11	—	—	—	
Queen's County - - - - -	21,091	1	11	7,484	12	2	
Roscommon - - - - -	50,481	12	10	5,204	17	6	
Sligo - - - - -	20,963	13	6	2,977	8	6	
Tipperary - - - - -	123,705	5	1	42,326	5	1	
Tyrone - - - - -	54,510	19	—	26,999	11	5	
Waterford - - - - -	88,894	1	10	17,559	10	6½	
Westmeath - - - - -	35,578	14	4	3,500	—	—	
Wexford - - - - -	33,682	6	3	4,958	15	3	
Wicklow - - - - -	41,868	1	3	56,074	11	5½	
	£. 1,934,732	—	8	673,316	10	—½	

April 1st, 1822.

Alexander Taylor.

(N^o 5).—ABSTRACT of Estimates of TURNPIKE ROADS.

TITLE OF SURVEY.	AMOUNT of ESTIMATE.		In the COUNTIES of	OBSERVATIONS.
	£.	s. d.		
Curraha to Slane - - -	5,948	4 6	Meath - - -	The trustees of this road have improved the line in part, and a coach runs on it; but the post masters have no means of ascertaining whether they intend to raise money to complete the road, according to the post office survey, or of the state of their debt; and whether, without the aid of county presentments, their tolls would be sufficient security to raise money thereon for such purpose.
Drogheda to Donaghadee -	38,181	18 2	Drogheda town, Louth, Armagh and Down.	This line is a turnpike road so far as Lisburn, in the county Down. Some improvements have been made, both in Louth and Armagh, by the trustees, but a considerable part of the original designs remain to be completed; and these trustees have, through inability to raise the money, rejected the greater part of the estimates.
Dublin to Carlow - - -	129	7 2	Carlow - - -	Under the control of the trustees for the second division of the turnpike road between Dublin and Cork.—This sum was estimated to fill gries along the present road, but was not applied, and may be said to be rejected.
Ditto to Ditto - - -	4,167	5 9	Kildare - - -	This line was surveyed previous to the New Ross and Waterford line; it was 6½ miles in length through this county, and rejected by the trustees and grand jury as too near, and almost parallel to the Castledermot road.
- - - to Drogheda - - -	13,904	8 3½	Dublin - - -	The line here estimated shortens 1½ mile to avoid the hill at Balruddery, and at the Man of War and the town of Balbriggan, and runs 15 miles in length through Dublin county. A subsequent survey was ordered by the postmaster general, of the Man of War, to pass through Balbriggan, and was found to exceed the standard of 1 in 35 in several places. Another line, farther west than the first, equally short, over firmer ground, was surveyed preparatory to examination by the commissioners for granting public money, all of which were rejected.
- - - - -	5,427	10 11	Meath.	
- - - to Enniskillen - - -	5,293	4 2	Dublin - - -	Rejected by the trustees of the Navan turnpike road, aid having been refused by the county of Dublin; these designed improvements were, so far as respects this county, rejected.
- - - to Enniskillen - - -	10,050	8 0	Meath - - -	This road is also under the control of the Navan turnpike board, so far as town of Navan, who have carried into effect the designs suggested without aid from the treasury. The design for the improvement of the road north of Navan was approved of by the grand jury of this county and the work commenced, but afterwards abandoned.
- - - to Howth - - -	6,747	— —	Dublin - - -	See (N ^o 3.) p. 53. See (N ^o 3.) p. 53. See (N ^o 3.) p. 53.
- - - to Ditto - - -	4,000	— —	Ditto - - -	
- - - to Lucan - - -	3,494	5 —	Ditto - - -	
- - - to Galway - - -	3,787	12 6	Dublin - - -	This line is on the Mullingar turnpike road, so far as Kinneagad, in the county of Westmeath, and is noticed in (N ^o 1.) p. 47, under the title of the Mullingar road. The trustees have improved the road in some places in the county Westmeath, according to the post office designs; but the post masters have not cognizance how the money was raised. The grand jury of the county of Roscommon approved of the survey; and in Galway the grand jury approved in part, and raised some money for the purpose, which was expended according to the estimate; but the exact portions approved or rejected cannot be ascertained by the postmasters general.
- - - to Ditto - - -	15,333	18 10	Westmeath.	
- - - to Ditto - - -	9,448	4 1	Roscommon.	
- - - to Ditto - - -	15,897	5 2	Galway.	
- - - to Ratoath and Curraha Curraha branch only - - -	2,894 3,785	7 2 10 —	Dublin - - Meath.	
				The money for this line was advanced to the trustees by the treasury. The road has been made under a special act of parliament, passed in 1816, vesting the tolls in Messrs. Bourne for a term of years.—Estimate approved.

TITLE OF SURVEY.	AMOUNT of ESTIMATE.	In the COUNTIES of	OBSERVATIONS.
Kilcock to Kinnegad - -	£. s. d. 2,300 — —	Kildare -	A Re-survey of so much of Mullingar turnpike road was made at the request of the trustees, to avoid the hill of Cappagh, and other steepes.—Survey and estimate approved, and the road made for the estimate.
Kileullen Green to Kilkenny -	5,971 2 1	Kildare -	This line was a turnpike road when the survey was made, and was under the title of the Timahoe turnpike road, but its period has expired, so far as regards this county, upon the expiration of the trust.—Plans and estimates were laid before the Grand Jury and approved of; but no presentment was made, in consequence of the Duke of Leinster having taken some proceedings to obtain an act of parliament to continue the turnpike tolls which had been levied under the old act, but it was not carried into effect.—No presentment was made to keep the old road in repair, or improve it according to the post office survey and the within estimate. The two Cork mail coaches are obliged to travel above two miles round four times every day, as the road is impassable.
Ditto - - - to Ditto -	6,609 12 2	Queen's County	This being on the trust of the old turnpike road between Timahoe and Kilkenny, the trustees approved of the post office designs and estimate, and raised the money by loan from the treasury, under the provisions of the post road acts.—The grand jury of this county granted 875 <i>l.</i> to defray the purchase of the land: the road was made for the estimate.
Ditto - - - to Ditto -	5,333 4 5	Kilkenny County and City.	The two grand juries granted the presentments to purchase the land, and also presented in aid of the tolls, having entirely approved of the design.—The entire of the new road from the bounds of the counties of Kildare and Queen's county on to the city of Kilkenny is finished, and all within the estimate.
Kilkenny to Nine Mile House	4,743 11 —	Kilkenny -	This design was executed for the estimate, on the Dublin and Cork turnpike road.
	14,193 9 6	Tipperary -	This portion only in part executed, and the postmasters general have not cognizance of the money expended, or the means by which it was raised.
Killarney to Tralee - -	10,612 2 —	Kerry -	The money was raised by county presentment, though a turnpike road, and alledged to be deficient to complete the designs, and afterwards a further sum of 3,269 <i>l.</i> 17 <i>s.</i> 7 <i>d.</i> was presented and raised, and said to be likewise deficient for that purpose; upon which a third sum of 4,889 <i>l.</i> 16 <i>s.</i> 6 <i>d.</i> was granted, and the road finished; see No. 3, p. 54.

April 1st, 1822.

Alexander Taylor.

(N° 6.)—AMOUNT of Presentments for POST ROADS.

COUNTY.	SUM PRESENTED.	—	OBSERVATIONS.
	£. s. d.		
Antrim - - - - -	10,146 19 8½		A considerable portion, almost the whole of the sums presented herein were to be raised at twelve successive assizes, and a great portion of the presentments were not strictly legally drawn; and in consequence of the informality, the sums required were not advanced from the treasury; and such presentments have lain a dead letter, and no proceedings have been taken thereon; but the annexed list is not vouched by the postmasters general as correct, as they have not any official knowledge of the sums presented.
Armagh - - - - -	— - -		
Cavan - - - - -	23,080 — —		
Cork - - - - -	177,800 15 7½		
Carlow - - - - -	— - -		
Clare - - - - -	19,896 11 6		
Dublin - - - - -	21,309 3 6½		
Down - - - - -	19,500 — —		

COUNTY.	SUM PRESENTED.	—	OBSERVATIONS.
	£. s. d.		
Drogheda county and town	- - -		
Donegal	- - -		
Fermanagh	36,500 — —		
Galway	4,152 11 2		
Kildare	- - -		
King's County	- - -		
Kilkenny	11,650 13 11		
Kerry	76,234 1 10		
Limerick	47,605 13 2		
Louth	12,838 2 6		
Leitrim	- - -		
Longford	4,318 7 —		
Londonderry	10,000 — —		
Meath	9,585 2 2		
Monaghan	21,812 15 11½		
Mayo	- - -		
Queen's County	7,484 12 2		
Roscommon	5,204 17 6		
Sligo	2,977 8 6		
Tipperary	42,326 5 1		
Tyrone	26,999 11 5		
Waterford	17,559 10 6½		
Westmeath	3,500 — —		
Wexford	4,958 15 3		
Wicklow	56,074 11 5½		

A considerable portion, almost the whole of the sums presented herein, were to be raised at twelve successive assizes, and a great portion of the presentments were not strictly legally drawn; and in consequence of the informality, the sums required were not advanced from the Treasury; and such presentments have lain a dead letter, and no proceedings have been taken thereon; but the annexed list is not vouched by the postmasters general as correct, as they have not any official knowledge of the sums presented.

April 1st, 1822.

Alexander Taylor.

(N^o 7.)—AMOUNT of Presentments exceeding ORIGINAL ESTIMATES.

COUNTY.	PRESENTMENTS exceeding Original Estimates.	—	OBSERVATIONS.
	£. s. d.		
Cavan	1,534 — —		
Cork	37,139 1 7		
Fermanagh	20,000 — —		
Kerry	24,576 5 2½		
Limerick	6,000 — —		
Wicklow	14,706 10 2½		

These are the only counties which have been reported to the postmasters general by their surveyors, to have exceeded the original estimates by presentments to the annexed amount.

The surveyors cannot have direct cognizance of the sums which have been presented, as presentments may have been made at several assizes at which they had not been ordered to attend, as upon several occasions, at the request of the grand juries, the postmasters general have sent their surveyors to attend them, and afterwards no presentments were made; which has latterly generally prevented them from incurring expense, when there was not a certainty of obtaining the presentments required.

April 1st, 1822.

Alexander Taylor.

RECAPITULATION

Of the ABSTRACTS required in the seven foregoing Orders; with the Extent of Surveys and Re-surveys in each County.

COUNTY.	EXTENT in MILES.	AMOUNT of Original ESTIMATE.	AMOUNT presented.	Subsequent PRESENTMENTS exceeding Original Estimates.
		£. s. d.	£. s. d.	£. s. d.
Antrim - - - - -	47	82,384 17 7 $\frac{1}{2}$	10,146 19 8 $\frac{1}{2}$	—
Armagh - - - - -	30	23,468 9 5 $\frac{1}{2}$	—	—
Carlow - - - - -	53	27,460 2 1	—	—
Cavan - - - - -	28	26,156 7 6	21,546 — —	1,534 — —
Clare - - - - -	79	66,187 19 4	19,896 11 6	—
Cork, (county and city) - - - - -	297	416,811 16 4	140,661 14 — $\frac{1}{2}$	37,139 1 7
Donegal - - - - -	14	13,540 16 5	—	—
Down - - - - -	55	86,175 19 5	—	—
Drogheda, (county of the town of) - - - - -	1 $\frac{1}{2}$	424 1 3	—	—
Dublin - - - - -	102 $\frac{1}{2}$	66,493 17 —	21,309 3 6 $\frac{1}{2}$	—
Fermanagh - - - - -	36	35,300 — —	16,500 — —	20,000 — —
Galway (county and town of) - - - - -	71	70,515 14 7	4,152 11 2	—
Kerry - - - - -	75	51,657 16 8	51,657 16 8	24,576 5 2 $\frac{1}{2}$
Kildare - - - - -	93 $\frac{1}{2}$	65,815 12 1	—	—
Kilkenny, (county and city of) - - - - -	92	87,488 16 4	11,650 13 11	—
King's County - - - - -	17	16,458 13 4	—	—
Leitrim - - - - -	12	8,302 5 4	—	—
Limerick, (county and city of) - - - - -	121	95,139 8 2	41,605 13 2	6,000 — —
Londonderry, (d ^r - - d ^r -) - - - - -	83	68,606 1 11	10,000 — —	—
Longford - - - - -	31	20,913 18 4 $\frac{1}{2}$	4,318 7 —	—
Louth - - - - -	50	20,490 3 4	12,838 2 6	—
Mayo - - - - -	31 $\frac{1}{2}$	49,196 10 11	—	—
Meath - - - - -	54	40,572 15 3	9,585 2 2	—
Monaghan - - - - -	35	24,394 1 11 $\frac{1}{2}$	21,812 15 11 $\frac{1}{2}$	—
Queen's County - - - - -	26	21,091 1 11	7,484 12 2	—
Roscommon - - - - -	70 $\frac{1}{2}$	50,481 12 10	5,204 17 6	—
Sligo - - - - -	38	20,963 13 6	2,977 8 6	—
Tipperary - - - - -	129	123,705 5 1	42,326 5 1	—
Tyrone - - - - -	67	54,510 19 —	26,999 11 5	—
Waterford, (county and city of) - - - - -	88	88,894 1 10	17,559 10 6 $\frac{1}{2}$	—
Westmeath - - - - -	49	35,578 14 4	3,500 — —	—
Wexford - - - - -	39 $\frac{1}{2}$	33,682 6 3	4,958 15 1	—
Wicklow - - - - -	52	41,868 1 3	41,368 1 3	14,706 10 2 $\frac{1}{2}$
	2,068	1,934,732 — 8	569,560 13 — $\frac{1}{2}$	103,955 17 —

April 1st, 1822.

Alexander Taylor.

(N^o 8 - - - to - - - N^o 13.)

AN ABSTRACT of all Surveys of Roads, made under warrants of the Postmaster General of detailing the particular Lines of Road, together with the Number of Miles in each;—also, to the Trustees of Turnpike Roads from those laid before the Grand Juries of Counties;—also, Grand Juries of Counties, together with the Amount presented for their execution;—also, a Return Amount of the original Estimates furnished by the Postmaster General, distinguishing the Counties on which they have been chargeable;—also, the Particulars of all Lines of Road actually Geo. III, together with a Return of all Roads not perfected, but which have been partly executed; the Sum of Money requisite for completing such Lines of Road.

Note.—The Postmaster General has not cognizance of the amount of all such presentments as the grand juries of counties may have thought proper to make, from time to time, for the improvement of old roads, or for new roads made or making under the original post office surveys and estimates; but of such only as were granted upon their solicitation, when their surveyors attended the grand juries at the assizes; such information can only be obtained from the treasurers of counties and the trustees of turnpike roads. Although the grand juries have generally approved of the several surveys submitted to their consideration by the postmaster general, yet they frequently have deferred to make any presentment thereon at the same assizes, but in many instances have subsequently partially adopted the proposed improvements, and presented for the expense thereof accordingly; and such presentments have frequently been made and the money levied in the usual way under the post road acts, prior to the 45th and 46th Geo. III. without application to or aid from the lords of the treasury, of which the postmaster general could not have cognizance under existing statutes; nor can the postmaster general have cognizance of all subsequent presentments made for the raising of money to complete the lines of road which were surveyed under their authority, exceeding the original post office estimate, only in such cases as where complaints have been

A STATEMENT of the Amount of the Estimates for improving the several Lines of Post General to the several Grand Juries through whose respective Counties such Roads pass; the Surveys, and the Amount of subsequent Presentments, passed for such Roads, exceeding the upon each particular Road, together with the account of such Sums as upon the Estimates were all of which several Lines were surveyed under warrants from the Postmaster General of

LENGTH of SURVEY.	TITLE OF SURVEY.	COUNTY.	AMOUNT of Original ESTIMATE.
<i>M. f. p.</i>			<i>£. s. d.</i>
21 0 0	Belfast to Londonderry - - - -	Antrim - -	21,109 15 11
7 0 0	Lisburn to Belfast - - - -	Ditto - -	10,146 19 8½
	Belfast Bridge - - - -	Ditto - -	3,463 4 -
9 0 0	Randalstown to Ballymena - - - -	Ditto - -	9,176 4 -
10 0 0	Newry to Antrim - - - -	Ditto - -	9,488 14 -
47 0 0	Total within this County - - - £.		82,384 17 7½
1 0 0	Drogheda to Donaghadee - - - -	Armagh -	846 6 8
9 0 0	Newry to Antrim - - - -	Ditto - -	9,661 16 9½
20 0 0	Newry to Colerain - - - -	Ditto - -	12,960 6 -
30 0 0	Total within this County - - - £.		23,468 9 5½
23 0 0	Dublin to Enniskillen - - - -	Cavan - -	21,546 - -
5 0 0	Ditto west of Bruce Hill - - - -	Ditto - -	4,610 7 6
28 0 0	Total within this County - - - £.		26,156 7 6

(N° 8 - - - to - - - N° 13.)

Ireland, in consequence of the Acts of the 45th Geo. III. c. 43, and the 46th Geo. III. c. 134; the Amount of the Estimates for the execution of all such Surveys; distinguishing those submitted showing such Surveys as have been approved of either by the Trustees of Turnpike Roads, or by of any further Presentments that have been made by Counties, subsequent to and beyond the particular Lines of Road for which such additional Presentments may have been made, and the finished under the Powers vested in the Postmaster General by the two Acts of the 45th and 46th setting forth the Amount of Presentments already made towards them, and the Period, as well as

been laid before them of the insufficiency of such estimate, the postmaster general not having any control in the expenditure of the money or in the direction of the works. The like observations equally apply to turnpike roads, many of which have been partially improved under the post office surveys, and estimates by their respective trustees out of their own funds, as well as by aid from the grand juries of counties in which they are situate, of which the postmaster general cannot give any certain information. All which particulars are explained in the column of observations. It is impossible to ascertain either the period or the sum which may be requisite to complete each line of road which may have been commenced, without an inspection and valuation thereof. The column of observations also gives such information on these heads as have come to the knowledge of the postmaster general. The postmaster general had not any legal authority to prevent deviations from their surveys after the money was drawn from the treasury, to make the new roads, where any such deviations have been made, and have come to the knowledge of the postmaster general, remarks have been made in the column of observations.

All the roads can be finished in three years, and for the amount of the original estimates, if under the direction of competent overseers.

Roads in Ireland, which, with the Surveys and Maps thereof, were submitted on behalf of the Postmaster gross Amount presented in each County for carrying into effect the Improvements suggested in such original Estimates; with explanatory Observations respecting the Presentments made in each County ordered by the Trustees of such Post Roads as are Turnpikes, and with like Observations thereon; Ireland.

AMOUNT Presented.	AMOUNT of subsequent PRESENTMENT exceeding Original Estimate.	OBSERVATIONS.
- - -	- - -	The grand jury have been presenting for this line at various assizes, but to what amount is not known.
10,146 19 8½	- - -	Presented agreeably to the original design, and the work executed.
- - -	- - -	Under consideration.
- - -	- - -	Recent surveys not yet decided upon by the grand jury.
- - -	- - -	- - Ditto - - - ditto - - - ditto.
10,146 19 8½	—	
- - -	- - -	The grand jury made some partial alterations on this line, and presented at various assizes, and the work is executed.
- - -	- - -	Recent survey not yet taken into consideration by the grand jury.
- - -	- - -	This line of survey not yet decided on, in consequence of a survey having been required on the eastern side of Lough Neagh, which has been lately made; the two lines, and their comparative merits, may be considered at the ensuing assizes.
—	—	
21,546 — —	1,534 — —	This survey was presented and acted upon, but a subsequent presentment was made by the grand jury to finish it;—amount 1,534 l.
- - -	- - -	To meet a line in the county of Meath, not yet acted upon.
21,546 — —	1,534 — —	
513.		

LENGTH of SURVEY.	TITLE OF SURVEY.	COUNTY.	AMOUNT of Original ESTIMATE.
<i>M. f. p.</i>			<i>£. s. d.</i>
4 0 0	Tallagh to Youghal - - - - -	Cork - -	8,785 9 2
4 0 0	Dungarvan to Youghal - - - - -	Ditto - -	43,455 16 4
23 0 0	Bandon to Bantry - - - - -	Ditto - -	23,512 8 6
3 0 0	Mitchelstown to Fermoy - - - - -	Ditto - -	3,162 1 -
13 0 0	Cork to Cove, by Ballvaly Bridge and Marino -	Ditto - -	59,459 6 10
6 0 0	Ditto - - South of Marino - - - - -	Ditto - -	47,335 14 -
10 0 0	Fermoy to Limerick, by Bruff - - - - -	Ditto - -	15,500 - -
5 0 0	North-west and South-west Approaches to the City of Cork.	Ditto - -	15,345 3 8
7 0 0	Redchair to Fermoy - - - - -	Ditto - -	7,173 15 6
27 0 0	Cork to Skibbereen - - - - -	Ditto - -	25,28 17 -
4 0 0	Ditto - - - - -	Cork City Liberties	3,025 4 7
4 0 0	Caher to Mitchelstown, by Clogheen and Bally- poreen.	Cork - -	3,315 6 -
1 0 0	Ditto - - - - - by Burnascourt - -	Ditto - -	651 16 8
15 0 0	Kilkenny to Cork, by Nine-mile House - -	Ditto - -	15,221 15 -
12 0 0	Cork to Kinsale - - - - -	Ditto - -	12,881 6 1
12 0 0	Ditto - - - by a second line - - -	Ditto - -	11,656 9 6
8 0 0	Ditto - - - by another line - - -	Ditto - -	8,340 17 -
25 0 0	Limerick to Cork, by Charleville and Mallow -	Ditto - -	18,930 12 -
3 0 0	Ditto - - - - -	Liberties	5,682 13 6
4 0 0	Castle Oliver to Mitchelstown - - - - -	Cork - -	3,746 13 -
12 0 0	Fermoy to Middleton - - - - -	Ditto - -	10,580 - -
24 0 0	Cork to Youghal - - - - -	Ditto - -	17,186 15 11
23 0 0	City of Waterford to the City of Cork - -	Ditto - -	39,513 19 3½
38 0 0	Cork to Skibbereen - - - - -	Ditto - -	12,939 1 7

AMOUNT Presented.			AMOUNT of subsequent PRESENTMENT exceeding Original Estimate.			OBSERVATIONS.
£.	s.	d.	£.	s.	d.	
8,785	9	2	-	-	-	Presented, not made. Not taken into consideration.
23,514	8	6	-	-	-	Presented and executed.
3,162	1	-	-	-	-	- Ditto - - ditto.
-	-	-	-	-	-	Consideration postponed.
-	-	-	-	-	-	- Ditto - - ditto.
-	-	-	-	-	-	Some part, next Fernoy, presented and executed.
-	-	-	-	-	-	A recent survey, now under consideration.
-	-	-	-	-	-	Consideration postponed.
25,128	17	-	21,939	1	7	Presented, but the line afterwards, in some parts, altered, and 21,939 l. 1s. 7d. subsequently presented by the grand jury, and the work executed.
3,025	4	7	2,000	-	-	Approved of and executed.
-	-	-	-	-	-	Rejected by the grand jury.
651	16	8	-	-	-	Presented and executed.
10,000	-	-	-	-	-	Partly presented and executed; the remaining part lies over for further consideration of the trustees.
12,881	6	1	-	-	-	Presented and executed.
-	-	-	-	-	-	These lines were surveyed at the desire of the grand jury, before they would take the original survey into consideration.
-	-	-	-	-	-	
18,930	12	-	10,000	-	-	A turnpike road. It has been executed from Cork, through Mal- low, to Buttevant; and partly executed from thence to Charleville.
-	-	-	-	-	-	Postponed.
10,580	-	-	-	-	-	Presented and executed.
5,564	17	5½	-	-	-	This survey commences on the Dublin and Cork road at Dun- kettle. The plan and estimate of the entire line were approved of by the grand jury; but they did not judge it expedient to grant

the amount for the entire line, as the county was so deeply in debt to Government for advances. They only presented the worst stage (between Killeagh and Youghal); the road was made by contract, and finished for the estimate. The presentment was advanced from the Treasury.

The plans and estimates have been twice before the grand jury: but although they approved of the designs, they deferred making any presentment, until the grand jury of the county of Waterford

had presented their portion of the line. One design of this survey by Dungourney, terminated with the junction of the Youghal road at the bridge of Glanmire. The other survey was by Watergrasshill road, thence by the river Bride and Conna. Both surveys terminated at nearly the same point, near Tallagh, and the bounds of both counties: would require three years to complete it.

The original survey and estimate for this road were made by Mr. Larkin; which latter being 25,128 l. 17 s. was presented by the grand jury, and advanced by government. The acting general

overseer reported to the grand jury, at a subsequent assizes, that this sum had been expended, and was insufficient to complete the road, which would require 9,000 l. in addition. This latter sum was also presented for, and advanced by government; and it was again reported to the grand jury, at another subsequent assizes, by the same general overseer, that having also expended this sum, he found it would require a still further sum of 12,000 l. which they presented accordingly, and applied to government for its advance.

From the excess of presentments required for this road, beyond the original estimate, the government thought proper to withhold this last sum, until an investigation should be made into the expenditures, which they ordered accordingly; and that it should be ascertained whether it had been occasioned by deviations from the original survey, or mismanagement, or otherwise.

Major Taylor and Sir Charles Coote were directed to make this inquiry, and, as they found the road in various states of progress, and the deviations from the original survey numerous, they judged it necessary to make a complete re-survey of the line as it then stood. They reported, that the value of the expenditure, upon the entire line, amounted to but 16,264 l. 4 s. 6½ d., although the general overseer had alledged to have previously expended 34,128 l. 17 s., the amount of the two first presentments. They also made an estimate of the sum requisite for the completion of the road, which amounted to 12,939 l. 1 s. 7 d., which the grand jury presented for; it was advanced by Government; and for this sum the road has been since completed. The reporters, by order of Mr. Peel, made a full statement to the government of their inquiry, of all the deviations, and the state of the works generally on this line of road.

(continued)

LENGTH of SURVEY.	TITLE OF SURVEY.	COUNTY.	AMOUNT of Original ESTIMATE.
<i>M. f. p.</i>			<i>£. s. d.</i>
10 0 0	Cork to Cove - - - - -	Cork - -	12,012 5 2
	Ditto - Dunkettle Bridge - - - -	City of Ditto -	1,268 9 —
297 0 0	Total within this County - - - £.		416,811 16 4
9 0 0	Royal Oak to Waterford, by Thomastown -	Carlow - -	1,359 11 6
4 0 0	Leighlin Bridge to Waterford, by Gore's Bridge, Greagnamana, &c.	Ditto - -	3,169 19 8
27 0 0	Dublin to Waterford, by Baltinglass and New Ross.	Ditto - -	19,419 11 —
2 0 0	Ditto to Carlow, by Baltinglass - - -	Ditto - -	129 2 7
11 0 0	Ditto to Cork - - - - -	Ditto - -	3,381 12 9
53 0 0	Total within this County - - - £.		27,460 2 1
9 0 0	Ennis to Canofin - - - - -	Clare - -	8,182 18 —
21 0 0	Limerick to Galway - - - - -	Ditto - -	21,480 16 8
17 0 0	Limerick, by Broadfort, to Gort - - -	Ditto - -	16,627 13 2
7 0 0	Gort to Crusheen - - - - -	Ditto - -	637 — —
25 0 0	Ennis to Kilrush - - - - -	Ditto - -	19,259 11 6
79 0 0	Total within this County - - - £.		66,187 19 4
7 0 0	Dublin to Enniskillen - - - - -	Dublin - -	5,298 4 2
7 0 0	Ditto to Galway - - - - -	Ditto - -	3,787 12 6
8 0 0	Ditto to Ratoath, by Curraha, Curraha branch -	Ditto - -	2,894 7 2
2 0 0	Ring's End to the Pigeon House - - -	Ditto - -	1,434 14 —
7 0 0	Dublin to Howth - - - - -	Ditto - -	4,000 — —
7 0 0	Ditto to Ditto - - - - -	Ditto - -	6,747 — —
7 0 0	Ditto to Lucan - - - - -	Ditto - -	3,494 5 —
4 0 0	Dublin towards Bray, by Stillorgan, to Cabinteely	Ditto - -	2,448 13 9½

AMOUNT Presented.			AMOUNT of subsequent PRESENTMENT exceeding Original Estimate.	OBSERVATIONS.
£.	s.	d.	£. s. d.	
3,000	—	—	3,200 — —	The bridge has been presented for, with the alteration of the stone arch to a swing bridge, which is the cause of the excess. Part of the road has also been formed by county presentments; the remainder postponed.
2,500	—	—		
140,661	14	—	37,139	1 7
—	—	—	—	Postponed.
—	—	—	—	Postponed.
—	—	—	—	This line passes, for the most part, through a waste and uncultivated country, intersected by many cross roads, a great part of which would have been rendered unnecessary by the adoption of this line; but notwithstanding, it was rejected by the county.
—	—	—	—	This comprehends about two and a half miles of the turnpike road by Castle Dermot, and the estimate was for filling, gripes, &c.; but the line being rejected in Kildare, this was not applied for.
—	—	—	—	Not executed.
—	—	—	—	
—	—	—	—	A recent survey, not yet taken into consideration.
—	—	—	—	Some part executed, near Gort.
—	—	—	—	Partly executed.
637	—	—	—	Executed.
19,259	11	6	—	The approved line was, at the request of the grand jury, estimated to the breadth of 32 feet only (not 42, as prescribed in the post road act); but the estimate of each width was laid before them.
The presentment was traversed, and, in consequence of the absence of a witness, the trial was postponed, and cannot now be brought to issue, the limitation having expired.				
A re-survey of a portion of this survey is now in hand, which will probably meet no opposition, and is nearly finished. No advance has yet been called for this presentment, nor any money yet raised off the county. The improvements would require two years to be completed.				
19,896	11	6	—	
—	—	—	—	Rejected by the grand jury.
—	—	—	—	Postponed.
2,894	7	2	—	Is a turnpike road, executed.
1,434	14	—	—	Executed.
4,000	—	—	—	This presentment is for a turnpike road, since which the road has been made, per contract, and finished for the estimate. It may be deemed a re-survey, another line having previously been surveyed; but, in consequence of the high purchase of the ground through which it was to pass, it was rejected by the grand jury of Dublin, whose jurisdiction it is to present for damages. The above presentment was advanced to the trustees by government.
6,747	—	—	—	Rejected; for reason, see preceding observation.
3,494	5	—	—	This survey was made at the request of the trustees of Dublin and Mullingar turnpike road, and may be deemed for its distance a re-survey of the line between Dublin and Athlone. The plan and estimate were approved of by the trustees, and presented for accordingly.
371	2	1	—	The money presented has been expended in filling the hollow near the off branch to Dundrum. The principal improvement to avoid the great steep at the eastern end of Stillorgan remains yet to be presented; but as the design to avoid the steep passes through demesne grounds, it cannot be accomplished under the present road acts, without the consent of the owner. The work has been done for the estimate, so far as presented.

LENGTH of SURVEY.	TITLE OF SURVEY.	COUNTY.	AMOUNT of Original ESTIMATE.
<i>M. f. p.</i>			<i>£. s. d.</i>
9 0 0	Dublin to Wexford - - - - -	Dublin - -	3,013 — 3½
15 0 0	Dublin to Drogheda - - - - -	Ditto - -	13,904 8 3½
5 0 0	Dublin to Waterford, by Baltinglass and New Ross	Ditto - -	11,027 6 5½
0 4 0	Dublin to Slane - - - - -	Ditto - -	347 8 —
3 0 0	Dublin to Parnel Bridge, to Crombin, &c. -	Ditto - -	1,393 13 10
1 0 0	Avenue from Parnel Bridge into the Liberty -	Dublin city, or West-street commissioners.	2,151 — —
10 0 0	Dublin through Tallagh to Brittas, by Ballynas-corney.	Dublin - -	3,850 — —
10 0 0	Dublin to Cork - - - - -	Ditto - -	707 4 6
102 4 0	Total within this County - - - £.		66,493 17 —
20 0 0	Newry to Downpatrick - - - - -	Down - -	18,696 15 10
26 0 0	Drogheda to Donaghadee - - - - -	Ditto - -	26,564 9 2
—	Belfast Bridge - - - - -	Ditto - -	32,463 4 —
5 0 0	Newry to Antrim - - - - -	Ditto - -	4,532 — 1
4 0 0	Belfast to Newtown Ards, re-survey - -	Ditto - -	3,919 10 4
55 0 0	Total within this County - - - £.		86,175 19 5
0 4 0	Dublin to Drogheda - - - - -	Drogheda -	186 3 3
1 0 0	Drogheda to Londonderry - - - - -	County of the town of Drogheda.	237 18 —
1 4 0	Total within this County - - - £.		424 1 3
9 0 0	Strabane to Londonderry, on the west side of the River Foyle.	Donegal -	8,940 16 5
5 0 0	Londonderry to Buncrana - - - - -	Ditto - -	4,600 — —
14 0 0	Total within this County - - - £.		13,540 16 5

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AMOUNT Presented.			AMOUNT of subsequent PRESENTMENT, exceeding Original Estimate.			OBSERVATIONS.
£.	s.	d.	£.	s.	d.	
1,870	7	2½	-	-	-	Two portions of new road have been presented on this line, and carried into execution after various applications and modifications. One of those between the Black Rock and Cabinteely, 1½ miles in length; the other from Little Bray to the bounds of the county of Wicklow, 7½ miles long. The remainder of the estimate has not been applied for, nor any of the other suggested improvements carried into effect.
-	-	-	-	-	-	A turnpike road. The line here estimated shortens 1½ mile, and avoids the hills of Man of War and Balruddery, and town of Balbriggan, 15½ miles in this county, not executed. A subsequent survey was made by order of the post office, east of Man of War, to pass through Balbriggan, and found in several places to exceed the standard of the act, viz. one foot in thirty-five. Another line farther west than the first, equally short, over firmer ground, surveyed preparatory to examination by the commissioners for granting public money; neither of which have been executed.
150	-	1	-	-	-	Several applications have been made to the grand jury of county of Dublin, but no presentment ensued, unless on a small piece detached from the rest of the county, about one quarter of a mile. The estimate comprehends five miles of the road, part of which being over difficult ground at Saggard, and in crossing the Liffey at Pouaficca, has deterred the grand jury from presenting. A committee of the late grand jury were appointed to perambulate part of the line, of which they approved, and have made a requisition to the post office accordingly.
347	8	-	-	-	-	Subsequent to the survey of this line, application was made to the post office by the grand jury (at the instance of Mr. Savage) for a new survey, under the impression that a part of the original passed over a flow bog and would be subject to inundation. A survey of about five miles was in consequence made, but found to possess no advantages over the former; the original line was therefore presented, and has been executed. None of the inconveniences apprehended have taken place.
-	-	-	-	-	-	A recent survey, not yet decided on by the commissioners of wide streets and Dublin grand juries.
-	-	-	-	-	-	This has been submitted to the grand jury of the city, but not yet decided on; it forms the continuation of the preceding.
-	-	-	-	-	-	Under the consideration of the county of Dublin grand jury.
-	-	-	-	-	-	Executed.
21,309	3	6½	-	-	-	
-	-	-	-	-	-	Postponed.
19,500	-	-	-	-	-	Is a turnpike road so far as the river Laggan near Lisburne. The survey was acted on, and the work, for the most part executed, partly by presentment under the 36th of the king, and partly by the tolls.
-	-	-	-	-	-	Under consideration.
-	-	-	-	-	-	A recent survey, not yet acted on.
-	-	-	-	-	-	Line approved of.
19,500	-	-	-	-	-	
-	-	-	-	-	-	Executed.
-	-	-	-	-	-	The plan and estimate were approved of by the grand jury; but the high valuation of the land through which the new road was to pass, prevented it being carried into effect until the lease of it expires, which is held under the corporation of Drogheda. Might be completed in one year.
-	-	-	-	-	-	
-	-	-	-	-	-	This line was rejected by the grand jury of this county, who refused to present for a road to convenience another county, and which only touched on the borders of their own; the river Foyle, which is the boundary between the two counties, being nearly parallel to the proposed road.
-	-	-	-	-	-	This survey is not yet completed.
-	-	-	-	-	-	

Continued

(continued)

LENGTH of SURVEY.	TITLE OF SURVEY.	COUNTY.	AMOUNT of Original ESTIMATE.
M. f. p. 18 0 0	Dublin to Enniskillen - - - - -	Fermanagh -	£. s. d. 18,000 — —
18 0 0	Ditto S. W. of Lough Erne - - - - -	Ditto - - -	17,300 — —
36 0 0	Total within this county - - - £.		35,300 — —
9 0 0	Gort to Loughrea - - - - -	Galway - - -	7,294 17 —
11 0 0	Limerick to Galway - - - - -	Ditto - - -	13,148 5 5
2 0 0	Ditto - - - - -	Liberties of d ^o town	2,092 9 4
6 0 0	Loughrea to Oranmore - - - - -	Galway - - -	6,348 2 —
21 0 0	Ballinasloe to Westport - - - - -	Ditto - - -	21,582 12 6
16 0 0	Dublin to Galway - - - - -	Ditto - - -	15,897 5 1
4 0 0	Limerick, by Broadford, to Gort - - - - -	Ditto - - -	3,412 18 6
3 0 0	Gort to Crusheen - - - - -	Ditto - - -	739 12 8
71 0 0	Total within this county - - - £.		70,515 14 7
10 0 0	Naas to Cashell - - - - -	Kildare - - -	9,676 13 3
9 0 0	Clane to Tullamore - - - - -	Ditto - - -	8,679 4 10
19 0 0	Clane to Ballingar - - - - -	Ditto - - -	18,700 — —
7 0 0	Naas to Castledurrow - - - - -	Ditto - - -	6,873 — —
4 0 0	Kilcock towards Kinnegad - - - - -	Ditto - - -	2,300 — —
11 0 0	Kilcullen Green to Kilkenny, through Athy - - - - -	Ditto - - -	5,971 2 1
6 4 0	Dublin to Carlow, by Baltinglass - - - - -	Ditto - - -	4,167 5 9
27 0 0	Dublin to Cork - - - - -	Ditto - - -	9,447 6 2
93 4 0	Total within this county - - - £.		65,815 12 1
2 0 0	Naas to Cashell - - - - -	King's County -	1,881 16 —
14 0 0	Clane to Tullamore - - - - -	Ditto - - -	14,217 18 —
1 0 0	Kilcullen Green to Kilkenny - - - - -	Ditto - - -	358 19 4
17 0 0	Total within this county - - - £.		16,458 13 4

AMOUNT Presented.			AMOUNT of subsequent PRESENTMENT, exceeding Original Estimate.			OBSERVATIONS.
£.	s.	d.	£.	s.	d.	
16,500	—	—	20,000	—	—	This line was presented and executed; but the subsequent presentments amounting to 20,000 <i>l.</i> were utterly unnecessary, as the work was proposed to be contracted for, for the amount of the two feet in width, as estimated and presented. <i>N.B.</i> An injudicious deviation from the line presented was made near Enniskillen, and injudiciously executed at a considerable extra expense, and on an erroneous affidavit.
—	—	—	—	—	—	
—	—	—	—	—	—	Presented in detached parts under 36th of the late King.
16,500	—	—	20,000	—	—	
—	—	—	—	—	—	Postponed.
—	—	—	—	—	—	This line was approved of by both grand juries, and presentments made from time to time, and partly executed.
—	—	—	—	—	—	
—	—	—	—	—	—	Postponed.
—	—	—	—	—	—	Partially acted upon, but not under the post road acts.
—	—	—	—	—	—	Some part of the improvements recommended were approved of by the grand jury of this county, presented for and executed.
—	—	—	—	—	—	
3,412	18	6	—	—	—	Executed.
739	12	8	—	—	—	Executed.
4,152	11	2	—	—	—	
—	—	—	—	—	—	Postponed for re-consideration.
—	—	—	—	—	—	Postponed for re-consideration.
—	—	—	—	—	—	Postponed for re-consideration.
—	—	—	—	—	—	Postponed for re-consideration.
—	—	—	—	—	—	This was a re-survey of so much of the Mullingar turnpike road, and was made at the request of the trustees to avoid Cappagh hill, and the road is finished for the estimate.
—	—	—	—	—	—	
—	—	—	—	—	—	Plans and estimates were laid before the grand jury and approved of, but no presentment made, in consequence of the Duke of Leinster having taken some proceedings to obtain an act of parliament to continue the turnpike tolls, which were levied under an old act then nearly expired, and which is now extinct: of course there are no tolls now levied, nor has any presentment been made since, to keep the present road in repair, or to make the improvements suggested by the post office. The mail coach has been obliged to be sent by other roads above two miles round.
—	—	—	—	—	—	
—	—	—	—	—	—	The jurisdiction of the act which has expired, extended only to Timahoe in the Queen's county.—See observation in Queen's county.
—	—	—	—	—	—	The several proposed improvements would require two years to be completed.
—	—	—	—	—	—	This line was surveyed previous to the New Ross line, six and a half miles of it within this county, which was rejected under the idea of its running too near and parallel to the line from Dublin by Castledermot, although some ill-directed and worse executed alterations have since been attempted on part of it.
—	—	—	—	—	—	
—	—	—	—	—	—	Executed so far as Red Gap.
—	—	—	—	—	—	
—	—	—	—	—	—	Postponed.
—	—	—	—	—	—	Postponed.
—	—	—	—	—	—	No presentment made for the same reason as alleged for this survey through the county Kildare, and the road in the same bad state.
—	—	—	—	—	—	
—	—	—	—	—	—	This portion of the King's county is entirely insulated by Kildare, and remote from any part of the county, which is a further reason why the grand jury are disinclined to present for this road.
—	—	—	—	—	—	
—	—	—	—	—	—	Would require one year to complete it.
—	—	—	—	—	—	

LENGTH of SURVEY.	TITLE OF SURVEY.	COUNTY.	AMOUNT of Original ESTIMATE.
<i>M. f. p.</i>			<i>£. s. d.</i>
4 0 0	Naas to Cashell - - - - -	Kilkenny -	3,627 12 -
15 0 0	Royal Oak to Waterford - - - - -	Ditto -	15,376 2 8
10 0 0	Waterford to Limerick - - - - -	Ditto -	10,074 5 -
7 0 0	Kilkenny to Cork, west of Sleibhnaman - - - - -	Ditto -	6,737 12 -
5 0 0	Ditto - by Nine Mile House - - - - -	Ditto -	4,743 11 -
2 0 0	Carrick on Suir, towards Waterford - - - - -	Ditto -	1,373 18 6
24 0 0	Leighlin Bridge to Waterford, by Gore's Bridge, Graighnamana, &c.	Ditto -	16,814 5 2
11 0 0	Thomastown to New Ross - - - - -	Ditto -	17,125 1 3
12 0 0	Dublin to Cork - - - - -	Ditto -	3,618 17 -
1 0 0	Kilcullen Green to Kilkenny, through Athy -	Liberties of City	5,533 4 5
1 0 0	Dublin to Cork - - - - -	Ditto -	2,464 17 4
92 0 0	Total within this County - - - £.		87,488 16 4
15 0 0	Limerick to Tralee by Adair, Rathkeal, &c. -	Kerry -	11,980 4 6
7 0 0	Ditto by Askeaton and Tarbert - - - - -	Ditto -	13,178 9 8
	Ditto - - - - -	Ditto -	- - -
15 0 0	Tralee to Killarney - - - - -	Ditto -	10,612 2 -
14 0 0	Killarney to Tralee - - - - -	Ditto -	4,889 16 6
	Tarbert to Tralee - - - - -	Ditto -	10,997 4

AMOUNT Presented.			AMOUNT of subsequent PRESENTMENT, exceeding Original Estimate.			OBSERVATIONS.
£.	s.	d.	£.	s.	d.	
-	-	-	-	-	-	Postponed.
-	-	-	-	-	-	Under consideration at last quarter sessions.
-	-	-	-	-	-	Postponed.
-	-	-	-	-	-	Postponed.
4,743	11	—	-	-	-	Executed.
1,373	18	6	-	-	-	Executed.
-	-	-	-	-	-	Postponed.
-	-	-	-	-	-	The plans and estimates were approved of by the grand jury three years ago, but no presentment to raise the money is yet made.
the necessary steps under the new grand jury presentment act, that the presentments might be made at the last sessions, which was complied with.						The county have lately called on the postmaster general to take
Would require three years to complete the line.						
-	-	-	-	-	-	Not executed.
5,533	4	5	-	-	-	Both the grand jury of the county and of the city granted the presentments, not only to purchase the land for the new parts of the road, but also gave further presentments in aid of the tolls.
The entire of the new road from the bounds of the counties of Kildare and Queen's county on to the city of Kilkenny is now finished, and all within the estimate; and sufficient money is in hands to make the widenings on the old road, where retained, and can be completed in one year.						
-	-	-	-	-	-	Not executed.
11,650	13	11	—	—	—	
11,980	4	6	-	-	-	Executed.
13,178	9	8	10,309	7	7½	For this line the amount of the estimate 13,179 <i>l.</i> was presented, and a subsequent presentment of 10,309 <i>l.</i> shortly after granted; this last sum however having failed of its object, as well as the first, a further sum of 10,997 <i>l.</i> has been since demanded, so that the county could have had for 13,179 <i>l.</i> (the offer having been made) the same thing for which they are, at the least, to pay 34,485 <i>l.</i>
-	-	-	10,997	—	—	
			yet wanting.			
10,612	2	—	3,269	17	7	Executed with this subsequent presentment.
4,889	16	6	-	-	-	This was a similar re-survey, estimate and valuation, as from Cork to Skibbereen, and was also ordered by government, and submitted with a full report. The original survey was made by Mr. Larkin, the estimate of which amounted to 10,612 <i>l.</i> 2 <i>s.</i> and was presented to be raised, and general overseers appointed to make the road, and were empowered to draw the money from the county treasurer to whom it was advanced by government. Above 18,000 <i>l.</i> was afterwards presented for this line, upon the request of the general overseers; and again, 1,469 <i>l.</i> 17 <i>s.</i> 7 <i>d.</i> making in all 13,881 <i>l.</i> 19 <i>s.</i> 7 <i>d.</i> ; but I (Sir Charles Coote) found no more value on the entire line, than 7,506 <i>l.</i> 2 <i>s.</i> 8 <i>d.</i> If the amount of the sum which I estimated to complete the road, be added to the alledged expenditure, it will appear above 10,000 <i>l.</i> is lost to the county. The road is now capitally made, and for the amount of my estimate.
10,997	4	—	-	-	-	This was also a re-survey and valuation similar to that from Cork to Skibbereen, and was ordered by government at the request of the grand jury.
The original survey was made by Mr. Larkin, the estimate of which amounted to 16,197 <i>l.</i> 4 <i>s.</i> 6 <i>d.</i> which was presented for and alledged to have been expended, as also several other additional sums.						
The whole of the sums alledged to have been expended, exceeding the original estimate, amounts to 10,309 <i>l.</i> 7 <i>s.</i> 7½ <i>d.</i> and 10,997 <i>l.</i> 4 <i>s.</i> as above, the amount of my (Sir C. Coote) estimate, was required to complete the road nearly two years ago, since which time it has had no repairs, and is altogether impassable; the small quantity of materials, which was applied very injudiciously before draining the road, are now worn away.						
This is the great circuit road between Limerick and Tralee, but the judges are now obliged to travel from Limerick to Cork, and from thence to Tralee; a round of about sixty miles.						

(continued)

LENGTH of SURVEY	TITLE OF SURVEY.	COUNTY.	AMOUNT of Original ESTIMATE.
M. f. f.			£. s. d.
	Tarbert to Tralee— <i>continued.</i>		
75 0 0	Total within this County -	£.	51,657 16 8
12 0 0	Waterford to Limerick - - - - -	Limerick -	9,316 19 6
5 0 0	Ditto - - - - -	Liberties of City -	4,833 14 2
2 0 0	Limerick to Galway - - - - -	Ditto -	1,450 19 -
9 0 0	Fermoy to Limerick - - - - -	Ditto -	2,546 12 -
1 0 0	Ditto - - - - -	County -	8,750 11 6
2 0 0	Caher to Mitchelstown, by Burnacourt - -	Ditto -	1,230 11 -
25 0 0	Limerick to Tralee, by Adair, Rathkeal, &c. -	Ditto -	21,167 9 -
2 0 0	Ditto - - - - -	Liberties -	2,798 4 -
25 0 0	Limerick to Tralee, by Askerton and Tarbert -	County -	25,348 16 6
1 0 0	Limerick, by Broadford, to Gort - - -	City Liberties -	306 10 -
4 0 0	Castle Oliver to Mitchelstown - - -	County -	3,927 15 -
1 0 0	Limerick to Tarbert, Sea Walls, at Glyn -	Ditto -	2,106 3 -
30 0 0	Cork to Limerick - - - - -	Ditto -	8,750 11 6
2 0 0	Ditto - - - - -	Liberties -	2,544 12 -
121 0 0	Total within this County -	£.	95,139 8 2
5 0 0	Ardee to Carrickmacross - - - - -	Louth -	4,431 1 6
27 0 0	Drogheda to Donaghadee - - - - -	Ditto -	10,720 19 4
18 0 0	Drogheda to Londonderry - - - - -	Ditto -	5,338 2 6
50 0 0	Total within this County -	£.	20,490 3 4
6 0 0	Kinnegad to Rooskey Bridge - - - - -	Leitrim -	5,300 - -
6 0 0	Rooskey Bridge to Sligo - - - - -	Ditto -	3,002 5 4
12 0 0	Total within this County -	£.	8,302 5 4
1 0 0	Rooskey Bridge to Sligo - - - - -	Longford -	318 7 -
9 0 0	Kinnegad to Rooskey Bridge - - - - -	Ditto -	8,300 - -
-	Longford Bridge - - - - -	Ditto -	1,900 - -
11 0 0	(Mullingar to French Park, by Ballymahon and) Elphin - - - - -	Ditto -	7,798 12 10½
10 0 0	- Ditto - by Longford and Tulsk - - -	Ditto -	3,096 18 6
31 0 0	Total within this County -	£.	20,913 18 4½

AMOUNT Presented.	AMOUNT of subsequent PRESENTMENT exceeding Original Estimate.	OBSERVATIONS.
£. s. d.	£. s. d.	

A presentment was made for this estimate of mine, of 10,997*l.* 4*s.* at Spring 1817, and re-presented the Summer following for the like sum; but government refused to advance the money, until a proper experienced person, to be approved of by government, should be contracted with to make the road, or to superintend the expenditure.

See my report and valuation respecting this road, delivered to government after Summer 1817.

The amount of the original estimate was advanced by government. The road could be completed in three years.

51,657 16 8	24,576 5 2½	
9,316 19 6	- - -	Executed.
4,833 14 2	- - -	Executed.
- - -	- - -	Postponed.
- - -	- - -	Postponed.
- - -	- - -	Postponed.
- - -	- - -	Postponed.
- - -	- - -	Postponed.
- - -	- - -	Executed.
25,348 16 6	6,000 — —	Executed.
- - -	- - -	Postponed.
- - -	- - -	Postponed.
2,106 3 —	- - -	Executed.
- - -	- - -	The greater part executed.
- - -	- - -	Executed.
41,605 13 2	- 6,000 — —	
- - -	- - -	Postponed.
7,500 — —	- - -	A turnpike road; the proposed improvements are partly executed.
5,338 2 6	- - -	Plans and estimates of several designs were laid before the grand jury of this county at various assizes, at their request, before they would determine on the line. They at length presented the line in the best direction; and their wishes were met by the grand jury of Monaghan, but after considerable expense had necessarily been incurred by the post office, to carry these presentments into effect.
		The grand jury of Louth presented another line at the subsequent assizes, which is generally the old road widened.
		The improvements on this line have all been executed for the estimate, and no advance from the treasury.
12,838 2 6	—	
- - -	- - -	These lines were twice submitted to the grand jury, by order of the post office, and their consideration postponed. They were afterwards brought forward by Mr. Wynne of Sligo, and I (Mr. Larkin) believe carried, but whether to the full extent or not is uncertain.
- - -	- - -	
- - -	- - -	
—	—	
318 7 —	- - -	Executed.
4,000 — —	- - -	Partly presented and executed.
- - -	- - -	The old bridge has had a temporary repair by a small presentment.
- - -	- - -	A recent survey under consideration.
- - -	- - -	Approved of by the grand jury, but no money presented as yet; could be completed in one year.
4,318 7 —	—	

LENGTH of SURVEY.	TITLE OF SURVEY.	COUNTY.	AMOUNT of Original ESTIMATE.
M. f. p.			£. s. d.
9 0 0	Drogheda to Londonderry - - - -	Londonderry -	4,721 4 7
3 0 0	Strabane to Londonderry, on the western side of the river Foyle.	D ^r , and Liber- ties of City.	3,963 3 6
1 0 0	Londonderry towards Belfast - - - -	County - -	8,684 8 1
33 0 0	Newry to Coleraine, by Dungannon - -	Ditto - -	32,431 5 6
3 0 0	Londonderry to Buncrana - - - -	Ditto - -	2,500 — —
33 0 0	Belfast to Londonderry - - - -	Ditto - -	16,306 — 3
83 0 0	Total within this County - - - £.		68,606 1 11
10 0 0	Dublin to Enniskillen - - - -	Meath - -	10,050 8 10
15 0 0	Curraha to Slane - - - -	Ditto - -	5,948 4 6
3 0 0	Dublin to Enniskillen, west of Bruce hill - -	Ditto - -	2,901 18 6
5 0 0	Ditto to Ratoath and Curraha, Curraha branch	Ditto - -	3,785 10 —
3 0 0	Ditto to Ratoath Branch - - - -	Ditto - -	2,832 4 —
3 0 0	Dublin to Galway - - - -	Ditto - -	3,206 3 —
5 0 0	Dublin to Drogheda - - - -	Ditto - -	5,427 10 11
10 0 0	Dublin to Slane - - - -	Ditto - -	6,370 15 6
54 0 0	Total within this County - - - £.		40,572 15 3
3 0 0	Ardee to Carrickmacross - - - -	Monaghan -	2,581 6 —
32 0 0	Drogheda to Londonderry - - - -	Ditto - -	21,812 15 11½
35 0 0	Total within this County - - - £.		24,394 1 11½
20 0 0	Ballinasloe to Westport - - - -	Mayo - -	19,097 4 6
28 0 0	Boyle to Ballina, by Ballaghadreen and Foxford	- - -	22,838 5 10
10 0 0	Boyle to Ballina, by Lough Talt - - -	- - -	7,261 — 7
58 0 0	Total within this County - - - £.		49,196 10 11

AMOUNT Presented.			AMOUNT of subsequent PRESENTMENT exceeding Original Estimate.			OBSERVATIONS.
£.	s.	d.	£.	s.	d.	
-	-	-	-	-	-	A small portion only of the improvements on this line have taken place, and were presented for under the general road act; of course the county did not call on the treasury for any advance.
-	-	-	-	-	-	Rejected by both grand juries of the county and city, as having been refused by the grand juries of Tyrone and Donegal.
-	-	-	-	-	-	This design commences at the bridge of Londonderry, and was principally in masonry, for building a wall along the river Foyle, to support the road which runs along the bank of the river, composed of a sandy soil, greatly exposed to injury from floods and tides. It has not yet been presented for.
-	-	-	-	-	-	This is a re-survey of about two miles in length of the survey between Londonderry and Belfast.
-	-	-	-	-	-	This line not yet decided on by the several grand juries; that part of it in the county of Tyrone was approved of, but no presentment yet made.
-	-	-	-	-	-	This survey is not yet completed; a part of it only has been submitted to the grand jury, and is approved of. Would require one year to complete the improvement suggested.
-	-	-	-	-	-	This line was approved of in part by the grand jury.
-	-	-	-	-	-	
-	-	-	-	-	-	A turnpike road as far as Navan, and the principal improvements suggested have been so far carried into effect, without the aid of government. The improvement adjoining, and to the north of Navan was commenced, and afterwards abandoned, and the line west of Bruce hill, in the town of Kells, was opposed, as leaving out part of that town, and the consideration of it deferred.
-	-	-	-	-	-	A turnpike road. The operations of the trustees not yet ascertained.
-	-	-	-	-	-	Consideration deferred.
3,785	10	-	-	-	-	New line partly executed. A turnpike road.
-	-	-	-	-	-	Not yet presented for.
-	-	-	-	-	-	Postponed.
-	-	-	-	-	-	A turnpike road. Not yet proceeded on.
5,799	12	2	-	-	-	The whole of the line estimated in this county, to the town of Slane, is ten miles; seven of which being entirely a new line, was presented and completed for the estimate; the remaining three miles, being part of the present road proposed to be repaired, remains in the same state, and would require one year to complete it.
9,585	2	2	-	-	-	
-	-	-	-	-	-	Postponed.
21,812	15	11½	-	-	-	Various plans and estimates were submitted to the grand jury at their request, before the final adoption of the line, which they only presented in portions from assizes to assizes. Some portion north of the town of Monaghan is a deviation from the original survey, and obviously a bad one. The greater portion of this road through the county is finished, and for the original estimate.
Although the whole amount of the estimate has been granted, that they might call on the government for the advances, yet no more has been paid from the treasury, to this period, than 13,701 l. 2 s. 1½ d. The unfinished portion might be completed in one year.						
21,812	15	11½	-	-	-	
-	-	-	-	-	-	Postponed.
-	-	-	-	-	-	Under consideration.
-	-	-	-	-	-	Not decided on, being rejected by Sligo grand jury. See Sligo.
-	-	-	-	-	-	

(continued)

LENGTH of SURVEY.	TITLE OF SURVEY.	COUNTY.	AMOUNT of Original ESTIMATE.
M. f. p.			£. s. d.
10 0 0	Naas to Cashell - - - - -	Queen's County	10,179 2 9
4 0 0	Naas to Castledurrow - - - - -	Ditto - -	4,302 7 -
12 0 0	Kilcullen Green to Kilkenny, through Athy -	Ditto - -	6,609 12 2
	Ditto - - - - -	Ditto - -	- - -
26 0 0	Total within this County - - -	£.	21,091 1 11
10 0 0	Dublin to Galway - - - - -	Roscommon -	9,448 4 1
5 0 0	Rooskey Bridge to Sligo - - - - -	Ditto - -	7,783 9 5
2 4 0	Boyle to Ballina, by Lough Talt - - -	Ditto - -	1,601 1 2
12 0 0	Boyle to Ballina, by Ballaghadireen and Foxford	Ditto - -	8,316 18 1
21 0 0	Mullingar to French Park, by Ballymahon and Elphin.	Ditto - -	12,268 5 5
20 0 0	Ditto - - by Longford and Talsk - -	Ditto - -	11,063 14 8
70 4 0	Total within this County - - -	£.	50,481 12 10
16 0 0	Rooskey Bridge to Sligo - - - - -	Sligo - -	2,977 8 6
20 0 0	Boyle to Ballina, by Lough Talt - - -	Ditto - -	15,816 14 8
2 0 0	Ditto - - - by Ballaghadireen and Foxford	Ditto - -	2,169 10 4
38 0 0	Total within this County - - -	£.	20,963 13 6
15 0 0	Tipperary, by Cashell, to Clonmel - - -	Tipperary -	14,817 13 -
11 0 0	Ditto - - Fethard line, towards Waterford and Limerick.	Ditto - -	10,489 4 -
7 0 0	Naas to Cashell - - - - -	Ditto - -	6,817 16 6
5 0 0	Cahir to Cashell - - - - -	Ditto - -	5,093 - -
27 0 0	Waterford to Limerick - - - - -	Ditto - -	26,468 10 8
8 0 0	Caher to Mitchelstown, by Clogheen and Ballyporeen.	Ditto - -	7,703 1 11
9 0 0	- - - Ditto - - - by Burnscourt - -	Ditto - -	8,596 12 6
13 0 0	Kilkenny to Cork, west of Sleibhnaman - -	Ditto - -	13,090 19 6
14 0 0	Kilkenny to Cork, by Nine Mile House - -	Ditto - -	14,193 9 6
8 0 0	Clonmel to Caher - - - - -	Ditto - -	5,877 6 6
12 0 0	Caher to Tipperary - - - - -	Ditto - -	10,357 11 -
129 0 0	Total within this County - - -	£.	123,705 5 1
42 0 0	Drogheda to Londonderry - - - - -	Tyrone - -	26,999 11 5
1 0 0	Strabane to Londonderry, on the western side of the river Foyle.	- - -	4,569 18 6

AMOUNT Presented.			AMOUNT of subsequent PRESENTMENT exceeding Original Estimate.			OBSERVATIONS.
£.	s.	d.	£.	s.	d.	
-	-	-	-	-	-	Postponed.
-	-	-	-	-	-	Postponed.
6,609	12	2	-	-	-	This being the turnpike road between Timahoe and Kilkenny, the plans and estimates were laid before the trustees of this road, who approved of it, and granted the money.
875	-	-	-	-	-	Debentures were issued, pursuant to the post road act, on the faith of government security. The money has been raised, and the road made for the estimate: 875 <i>l.</i> was granted by the grand jury to defray the purchase of the land.
7,484	12	2	-	-	-	
-	-	-	-	-	-	Approved of by the grand jury of this county.
5,204	17	6	-	-	-	Approved of by ditto.
-	-	-	-	-	-	Not decided on.
-	-	-	-	-	-	Not decided on.
-	-	-	-	-	-	Not decided on.
-	-	-	-	-	-	Approved of by the grand jury, but no presentment yet made : would require two years to complete it.
5,204	17	6	-	-	-	
2,977	8	6	-	-	-	Executed.
-	-	-	-	-	-	Rejected by the grand jury, as being nearly on the borders of their county, and chiefly beneficial to Mayo.
-	-	-	-	-	-	Ditto - - - ditto - - - ditto - - - ditto.
2,977	8	6	-	-	-	
-	-	-	-	-	-	Under consideration.
-	-	-	-	-	-	Under consideration.
-	-	-	-	-	-	Under consideration.
-	-	-	-	-	-	Approved, and some parts presented for at various assizes, and executed.
3,101	5	7	-	-	-	Partly executed, and in hands.
-	-	-	-	-	-	Rejected by grand jury.
8,596	12	6	-	-	-	Executed.
-	-	-	-	-	-	The grand jury have not come to any decision.
14,193	9	6	-	-	-	Partly executed.
5,877	6	6	-	-	-	Partly executed.
10,557	11	-	-	-	-	Partly executed.
42,326	5	1	-	-	-	
26,999	11	5	-	-	-	Several plans and estimates were under consideration of the grand jury before their final approbation of the line. Some portions, north of the town of Ballygawly, are deviations; the remainder of the presented line is that recommended by the post office. A considerable portion is finished, and within the original estimate. The advance from the treasury has been 24,045 <i>l.</i> 13 <i>s.</i> 9 <i>d.</i> Would require one year to complete it.
-	-	-	-	-	-	The wooden bridge over the river Foyle, entering the city of Londonderry, having been partly carried away with the ice in the year 1814, this survey was ordered by the postmaster general, to prevent the inconveniences which might occur from a similar cause, to which wooden bridges are so liable. An estimate was also ordered for the repairs of the bridge, which was made, and amounted to 16,000 <i>l.</i>
-	-	-	-	-	-	This survey was rejected by the grand jury of this county.

LENGTH of SURVEY.	TITLE OF SURVEY.	COUNTY.	AMOUNT of Original ESTIMATE.
M. f. p.			£. s. d.
8 0 0	Caledon to Aughnacloy - - - - -	- - - - -	6,041 16 1
16 0 0	Newry to Colerain by Dungannon - - - - -	- - - - -	16,899 13 -
67 0 0	Total within this County - - - - -		£. 54,510 19 -
6 0 0	Tallagh to Youghall - - - - -	Waterford -	9,945 17 -
15 0 0	Dungannon to Youghall - - - - -	Ditto -	20,740 6 2½
2 0 0	Royal Oak to Waterford - - - - -	Liberties -	1,905 17 -
1 0 0	Waterford to Limerick - - - - -	Ditto -	1,450 6 -
2 0 0	Kilkenny to Cork, by Nine Mile House - - - - -	County -	1,893 1 -
1 0 0	City of Waterford, to the New Packet Harbour of Dunmore. Ditto to Passage.	City -	1,344 1 1½
8 0 0	City of Waterford, to the New Packet Harbour of Dunmore. Ditto to Passage.	County -	6,969 12 5
2 0 0	City of Waterford, to the City of Cork - - - - -	Liberties of the county of the city.	5,478 1 8
45 0 0	- - - Ditto - - - Ditto - - - - -	County -	39,866 19 5
88 0 0	Total within this County - - - - -		£. 88,894 1 10
15 0 0	Dublin to Galway - - - - -	Westmeath -	15,333 18 10
12 0 0	Kinnegad to Roosky Bridge - - - - -	Ditto -	12,300 - -
11 0 0	Mullingar to French Park, by Ballymahon and Elphin.	Ditto -	3,972 7 9
11 0 0	Ditto by Longford and Tulsk - - - - -	Ditto -	3,972 7 9
49 0 0	Total within this County - - - - -		£. 35,578 14 4

AMOUNT Presented.			AMOUNT of subsequent PRESENTMENT exceeding Original Estimate.			OBSERVATIONS.
£.	s.	d.	£.	s.	d.	
-	-	-	-	-	-	These designs were surveyed at the request of the grand juries, the last of which was a re-survey. The approved line is a portion of each. The grand jury have however declined raising the money, or calling on government for the advance until the heavy debt due to the treasury for the Drogheda and Derry line, should be liquidated, a considerable portion of which is yet unpaid. Would require one year to complete the work.
-	-	-	-	-	-	This line of survey not yet decided on, in consequence of a survey having been required on the eastern side of Lough Neagh, which has been lately made. They have been submitted to the grand jury, and they have approved and presented some alterations, recommended between the post towns of Dungannon and Cookstown, but no money has yet been levied. The entire line could be completed in two years.
26,999	11	5	-	-	-	
9,945	17	-	-	-	-	A recent survey. The money has been presented, but the work not yet executed.
-	-	-	-	-	-	Under consideration.
-	-	-	-	-	-	Ditto.
-	-	-	-	-	-	Ditto.
-	-	-	-	-	-	Approved of, and some parts presented for at various assizes, and executed.
1,344	1	1½	-	-	-	This design has been approved of and presented for by the grand jury; and is nearly finished, and within the estimate. The entire of this road, within the city liberties, is also the road to Passage as well as to Dunmore Packet Harbour. Government has not been called on for any advance.
6,269	12	5	-	-	-	This presentment was for the direct line between Waterford and Dunmore, the money was advanced from the treasury, and the road is made for the estimate. The off branch from this line to the town of Passage has not yet been presented, and the packet station being now removed to Dunmore Harbour, renders its adoption improbable.
-	-	-	-	-	-	The plans and estimates were approved of by the grand jury, but no presentment has yet been made, as there is considerable difficulty to obtain a mutual agreement with the grand jury of the county as to the line to be approved departing from the city. The line through Bilberry Rock, near to the bridge of Waterford, is preferred by the county, but the entire of it, to its junction with the Portlaw road, passes through the liberties of the city, and is a very expensive line; and that which the city grand jury wished to adopt, would leave but an inconsiderable charge on their liberties, and be equally expensive to the county. This estimate is for the line recommended by the post office. Could be completed in one year.
-	-	-	-	-	-	For the reasons above stated the grand jury have not come to any conclusion as to the presentment for the line generally. The sum estimated herein is for the line to which they give the preference; and some of the improvements suggested in the survey have been adopted.
-	-	-	-	-	-	This being now a mail coach road between these cities, the designs recommended by the post office require attention. No advance having been made by government. Could be completed in three years.
17,559	10	6½	-	-	-	
-	-	-	-	-	-	A turnpike road, the trustees have acted partly on the plans submitted to them, but whether out of their own funds, without aid or not, is uncertain.
3,500	-	-	-	-	-	Partly presented and executed, and the remainder is held over for re-consideration.
-	-	-	-	-	-	Under consideration.
-	-	-	-	-	-	Under consideration.
3,500	-	-	-	-	-	

(continued)

(continued)

LENGTH of SURVEY.	TITLE OF SURVEY.	COUNTY.	AMOUNT of Original ESTIMATE.
<i>M. f. p.</i> 1 0 0	Thomastown to New Ross - - - -	Wexford -	£. s. d. 971 19 4½
31 0 0	Dublin to Wexford - - - -	Ditto - -	23,168 7 4½
1 4 0	Leighlin Bridge to Waterford - - - -	Ditto - -	4,114 14 6
6 0 0	Dublin to Waterford, by Baltinglass and New Ross	Ditto - -	5,427 5 0
39 4 0	Total within this county - - -	£.	33,682 6 3
1 0 0	Dublin to Arklow - - - -	Wicklow -	500 0 0
33 0 0	Dublin to Wexford - - - -	Ditto - -	24,271 17 5½
18 0 0	Dublin to Waterford, by Baltinglass and New Ross	Ditto - -	17,096 3 9½
52 0 0	Total within this county - - -	£.	41,868 1 3

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AMOUNT Presented.			AMOUNT of subsequent PRESENTMENT exceeding Original Estimate.			OBSERVATIONS.
£.	s.	d.	£.	s.	d.	
4,958	15	3	-	-	-	This was the estimate for the only practicable line for the continuation of this survey. The grand jury did not take it into consideration as yet, until the decision of the grand jury of Kilkenny. From Arklow to Wexford two surveys were made, occasioned by the death of the first surveyor, (Monks) on whose application (in 1807) no presentment took place. On the request of the county to the post office, in 1814, this (2d) survey was made, on which a presentment was granted from the bounds of the county to Gorey, 6½ miles.—Executed. The remainder of the line the county promised to take into consideration, but no application has since been made by the post office. The mails travel this line daily, although there are yet some steep and dangerous precipices, particularly at Enniscorthy, and near Ferry Carrick bridge, which could and ought to be obviated. Could be completed in three years. No presentment made. This is the remainder of the line into New Ross, a distance of 6½ miles over a country waste and uncultivated; and as no presentment took place in the county of Carlow, there was no application to the grand jury of the county of Wexford. Could be completed in two years.
4,958	15	3	-	-	-	
-	-	-	-	-	-	
-	-	-	-	-	-	
-	-	-	-	-	-	
4,958	15	3	-	-	-	
-	-	-	-	-	-	
24,271	17	5 ½	14,706	10	2 ½	This improvement was a re-survey of a small portion entering the town of Arklow, and was surveyed at the request of the grand jury. From Bray to the town of Wicklow two lines were surveyed, one through Kilcool, the other by Newtown M'Kennedy, the latter has been adopted, and is now fit for the conveyance of His Majesty's mails, with the exception of about five miles between Rathdrum and Arklow, which it is supposed will be finished in the course of next next Summer; 12,000<i>l.</i> of the subsequent presentment was raised by the county on the affidavits of the overseers, (without any estimate having been made on the part of the post office) in aid of the original estimate, and to complete other parts of the work. This county has presented the whole line from the bounds of Dublin county to Balinglass, a space of 18½ miles, and have, with some little exception, nearly finished the whole for the estimate here stated. An additional survey of about four miles was made near Donard, and at the demesne of Saunders Grove, by request of the grand jury, to the post office, being a deviation from the original line, which being equally short and level, has been adopted; but from the want of co-operation in the other counties, the part made in this county is in a great measure rendered useless as a mail coach road. A second line was surveyed at the request of the grand jury, as they disapproved of the original line along the banks of the river by Poulafouca.
17,096	3	9 ½	-	-	-	
41,368	1	3	14,706	10	2 ½	

ABSTRACT:

LENGTH of SURVEY.	COUNTY.	AMOUNT of original ESTIMATE.	AMOUNT Presented.	AMOUNT of subsequent PRESENTMENT, exceeding original ESTIMATE.
M. f. p.		£. s. d.	£. s. d.	£. s. d.
47 0 0	Antrim - - - -	82,384 17 7 $\frac{1}{2}$	10,146 19 8 $\frac{1}{2}$	—
30 0 0	Armagh - - - -	23,468 9 5 $\frac{1}{2}$	—	—
28 0 0	Cavan - - - -	26,156 7 6	21,546 — —	1,534 — —
297 0 0	Cork - - - -	416,811 16 4	140,661 14 — $\frac{1}{2}$	37,139 1 7
53 0 0	Carlow - - - -	27,460 2 1	—	—
79 0 0	Clare - - - -	66,187 19 4	19,896 11 6	—
102 4 0	Dublin - - - -	66,493 17 —	21,309 3 6 $\frac{1}{2}$	—
55 0 0	Down - - - -	86,175 19 5	19,500 — —	—
1 4 0	Drogheda - - - -	424 1 3	—	—
14 0 0	Donegal - - - -	13,540 16 5	—	—
36 0 0	Fermanagh - - - -	35,300 — —	16,500 — —	20,000 — —
71 0 0	Galway - - - -	70,515 14 7	4,152 11 2	—
93 4 0	Kildare - - - -	65,815 12 1	—	—
17 0 0	King's County - - - -	16,458 13 4	—	—
92 0 0	Kilkenny - - - -	87,488 16 4	11,650 13 11	—
75 0 0	Kerry - - - -	51,657 16 8	51,657 16 8	24,576 5 2 $\frac{1}{2}$
121 0 0	Limerick - - - -	95,139 8 2	41,605 13 2	6,000 — —
50 0 0	Louth - - - -	20,490 3 4	12,838 2 6	—
12 0 0	Leitrim - - - -	8,302 5 4	—	—
31 0 0	Longford - - - -	20,913 18 4 $\frac{1}{2}$	4,318 7 —	—
83 0 0	Londonderry - - - -	68,606 1 11	—	—
54 0 0	Meath - - - -	40,572 15 3	9,585 2 2	—
35 0 0	Monaghan - - - -	24,394 1 11 $\frac{1}{2}$	21,812 15 11 $\frac{1}{2}$	—
58 4 0	Mayo - - - -	49,196 10 11	—	—
26 0 0	Queen's County - - - -	21,091 1 11	7,484 12 2	—
70 4 0	Roscommon - - - -	50,481 12 10	5,204 17 6	—
38 0 0	Sligo - - - -	20,963 13 6	2,977 8 6	—
129 0 0	Tipperary - - - -	123,705 5 1	42,326 5 1	—
67 0 0	Tyrone - - - -	54,510 19 —	26,999 11 5	—
88 0 0	Waterford - - - -	88,894 1 10	17,559 10 6 $\frac{1}{2}$	—
49 0 0	Westmeath - - - -	35,578 14 4	3,500 — —	—
39 4 0	Wexford - - - -	33,682 6 3	4,958 15 3	—
52 0 0	Wicklow - - - -	41,868 1 3	41,368 1 3	14,706 10 2 $\frac{1}{2}$
2,068 0 0		£. 1,934,732 — 8	559,560 13 — $\frac{1}{2}$	103,955 17 —

(N^o 14.)—AN ACCOUNT of the Expense incurred in making Surveys and Re-surveys, and in Salaries or other Payments to Surveyors, under the Acts 45 and 46 Geo. III.

	SURVEYS and RE-SURVEYS.	SALARIES.
	£. s. d.	£. s. d.
In year ended 5th January 1806 - - - - -	432 11 3	141 16 2
— 5th January 1807 - - - - -	2,132 5 4 $\frac{1}{2}$	568 15 —
— 5th January 1808 - - - - -	1,459 14 1	433 3 7 $\frac{1}{2}$
— 5th January 1809 - - - - -	1,981 13 10 $\frac{1}{2}$	562 10 2 $\frac{1}{2}$
— 5th January 1810 - - - - -	4,093 15 1 $\frac{1}{2}$	568 15 —
— 5th January 1811 - - - - -	3,556 15 8 $\frac{3}{4}$	568 15 —
— 5th January 1812 - - - - -	5,267 14 10 $\frac{1}{2}$	568 15 —
— 5th January 1813 - - - - -	2,037 13 10 $\frac{1}{2}$	426 11 3
— 5th January 1814 - - - - -	1,775 — 10	568 15 —
— 5th January 1815 - - - - -	3,314 10 9 $\frac{1}{2}$	568 15 —
— 5th January 1816 - - - - -	5,008 4 7 $\frac{1}{2}$	568 15 —
— 5th January 1817 - - - - -	4,369 13 7	568 15 —
— 5th January 1818 - - - - -	1,741 16 4	710 18 9
— 5th January 1819 - - - - -	497 15 9	568 15 —
— 5th January 1820 - - - - -	1,534 9 3	568 15 —
— 5th January 1821 - - - - -	868 19 5 $\frac{1}{2}$	568 15 —
— 5th January 1822 - - - - -	337 18 7 $\frac{1}{2}$	568 15 —
£.	40,410 13 5	9,100 — —

Receiver General's Office,
General Post Office, Dublin,
8th of March 1822.

G. C. Swan,
Receiver Genl.

(N^o 15 & 16.)—A RETURN of the Number of Mail Coaches in Ireland; of the Conditions of the Contracts for each Contract has to run; and of the Hours of Departure and Arrival at and from Dublin; and at and from are provided for the Use of the Post Office of

LINE OF ROADS.	NAME of CONTRACTORS.	Description of Carriage and Number of Horses by which same is conveyed.	Number of Inside and Outside Passengers.	Number of Miles per Hour, specified by Contract to be conveyed, including all stoppages.	Allowance per Mile, each Way, for Six Days Weekly.
Dublin to Belfast - -	Anderson & Green	coach drawn by 4 horses	4 inside & 1 outside	five miles - -	3 d.
Dublin to Cork - -	John Anderson - -	- - - by 4 d ^o -	6 inside & 3 outside	to perform the journey in 26 hours.	3 d.
Dublin to Cork, by Ca- shel.	John Anderson - -	- - - by 4 d ^o -	4 inside & 2 outside	to perform the journey in 26 $\frac{1}{2}$ hours.	4 $\frac{1}{2}$ d.
Dublin to Derry - -	David Watt - -	- - - by 4 d ^o -	4 inside & 1 outside	five miles - -	3 d.
Dublin to Enniskillen -	Wm. Dillon - -	- - - by 4 d ^o -	4 inside & 3 outside	five miles - -	4 $\frac{1}{2}$ d.
Dublin to Galway - -	Richard Bourne - -	- - - by 4 d ^o -	4 inside & 1 outside	five miles - -	6 $\frac{1}{2}$ d.
Dublin to Howth - -	Charles M'Dowall	- - - by 4 d ^o -	4 inside & 2 outside	to perform the jour- ney in 1 hour.	No specific sum per mile; but an annual allowance of 230 l.
Dublin to Limerick -	William Bourne -	- - - by 4 d ^o -	4 inside & 1 outside	to perform the journey in 24 hours.	3 d.

the same, in respect to the Rate of Travelling; the Number of Passengers; the Price paid per Mile; and the Time the principal Towns they pass through and go to;—and also, a Return showing in what manner Mail Coaches Ireland, and of the Annual Expense of the same.

Hours of Dispatch and Arrival at and from Dublin.		PRINCIPAL TOWNS on the Line.	Hours of Dispatch and Arrival at and from the Principal Towns.		By whom the Coaches are provided.	The Time each Contract has to run.	OBSERVATIONS.
Dispatch.	Arrival.		Arrival down.	Dispatch up.			
8 P. M.	6 A. M.	Drogheda -	12 15 A.M.	1 35 A.M.	by the contractors at their expense.	until 5 Feb. 1833	In consideration of this coach performing the journey in 15 hours, two additional outside passengers are permitted.
		Dundalk -	3 14 A.M.	10 35 P.M.			
		Newry -	5 0 A.M.	8 30 P.M.			
		Banbridge -	7 6 A.M.	6 40 P.M.			
		Hillsboro' -	8 56 A.M.	4 50 P.M.			
		Lisburn -	9 30 A.M.	4 20 P.M.			
		Belfast -	11 0 A.M.	3 0 P.M.			
7 P. M.	6 A. M.	Naas -	9 40 P.M.	3 5 A.M.	- d ^e -	until 5 Feb. 1833	This coach performs the journey down in 22 hours, and up in 24, carrying four inside passengers, and one additional outside.
		Kilcullen -	10 35 P.M.	2 5 A.M.			
		Ballymore -	11 50 P.M.	12 40 A.M.			
		Carlow -	1 40 A.M.	10 40 P.M.			
		Kilkenny -	5 0 A.M.	6 40 P.M.			
		Clonmel -	9 20 A.M.	2 5 P.M.			
		Fermoy -	2 0 P.M.	9 10 A.M.			
		Cork -	5 0 P.M.	6 0 A.M.			
8 P. M.	6 A. M.	Athy -	2 30 A.M.	11 30 P.M.	- d ^e -	until 5 Feb. 1833	The six inside passengers by contract, via Clonmel, are transferred to this line, and the journey is performed in 25 ½ hours.
		Stradbally -	3 40 A.M.	10 15 P.M.			
		Abbelex -	5 30 A.M.	8 25 P.M.			
		Durrow -	6 55 A.M.	6 45 P.M.			
		Cashel -	11 5 A.M.	1 55 P.M.			
		Caher -	1 40 P.M.	12 35 P.M.			
		Mitchelstown -	4 35 P.M.	10 0 A.M.			
8 P. M.	6 A. M.	Balbriggan -	10 40 P.M.	3 18 A.M.	- d ^e -	until 5 July 1826	In consideration of the journey being performed in 22 hours, two additional outside passengers are permitted.
		Drogheda -	12 8 A.M.	1 50 A.M.			
		Collon -	1 28 A.M.	12 35 P.M.			
		Ardee -	2 11 A.M.	11 45 P.M.			
		Carrickmacross -	4 16 A.M.	9 40 P.M.			
		Castleblaney -	5 56 A.M.	7 55 P.M.			
		Monaghan -	7 56 A.M.	5 25 P.M.			
		Aughnacloy -	10 1 A.M.	3 35 P.M.			
		Omagh -	12 51 P.M.	12 35 P.M.			
		Newton Stewart -	2 26 P.M.	11 5 A.M.			
		Strabane -	3 50 P.M.	9 30 A.M.			
		Derry -	6 0 P.M.	7 30 A.M.			
8 P. M.	6 A. M.	Dunshaughlin -	10 50 P.M.	3 15 A.M.	- d ^e -	no contract executed.	
		Navan -	12 30 A.M.	1 25 A.M.			
		Kells -	2 0 A.M.	11 50 P.M.			
		Virginia -	3 50 A.M.	10 3 P.M.			
		Cavan -	6 40 A.M.	6 45 P.M.			
		Enniskillen -	12 0 noon.	2 0 P.M.			
8 P. M.	6 A. M.	Leixlip -	9 30 P.M.	4 5 A.M.	- d ^e -	until 5 Oct. 1827	The Sunday mail conveyed free of charge.
		Maynooth -	10 25 P.M.	3 15 A.M.			
		Kilcock -	11 0 P.M.	2 30 A.M.			
		Kinnegad -	1 50 A.M.	11 25 P.M.			
		Kilbeggan -	4 57 A.M.	8 50 P.M.			
		Monate -	6 25 A.M.	7 0 P.M.			
		Athlone -	7 55 A.M.	5 10 P.M.			
		Ballinasloe -	10 30 A.M.	2 55 P.M.			
		Loughrea -	1 25 P.M.	12 10 P.M.			
		Galway -	5 0 P.M.	9 0 A.M.			
7 A. M.	uncertain	Howth -	8 0 A.M.	uncertain	- d ^e -	until 6 Oct. 1826	
8 P. M.	6 A. M.	Naas -	11 0 P.M.	2 30 A.M.	- d ^e -	until 5 July 1823	In consideration of the journey being performed in 19 hours, two additional outside passengers are permitted.
		Monasterevan -	2 11 A.M.	11 20 P.M.			
		Maryboro' -	4 20 A.M.	9 10 P.M.			
		Mountrath -	5 40 A.M.	7 30 P.M.			
		Roscrea -	8 25 A.M.	4 55 P.M.			
		Nenagh -	11 10 A.M.	2 15 P.M.			
		Limerick -	3 0 P.M.	11 0 A.M.			

LINE OF ROADS	NAME of CONTRACTORS.	Description of Carriage, and Number of Horses by which same is conveyed.	Number of Inside and Outside Passengers.	Number of Miles per Hour specified by Contract to be conveyed, including all stoppages.	Allowance per Mile, each Way, for Six Days, Weekly.
Dublin to Waterford -	Peter Purcell -	coach drawn by 4 horses	4 inside & 1 outside	five miles -	about 4d. the annual sum 949 l. 8 s. 8 d.
Dublin to Wexford -	Messrs. Hughes & Co.	- - - by 4 d ^s -	4 inside & 3 outside	five and half miles	7 d.
Belfast to Derry -	Messrs. C. Gra- ham & Co.	- - - by 4 d ^s -	4 inside & 3 outside	five miles -	6 d.
Belfast to Donaghadee -	- - D ^r -	- - - by 4 d ^s -	4 inside & 3 outside	six miles -	No specific sum per mile; but an annual allowance of 350 l.
Ballinasloe to Westport	Richard Bourne -	- - - by 3 d ^s -	4 inside & 4 outside	five miles -	6 ½ d.
Clonmel to Waterford -	Philip Gilliard -	- - - by 4 d ^s -	6 inside & 4 outside	five miles -	No specific sum per mile; but an annual allowance of 411 l.
Cork to Skibbereen -	Michael Galloway	- - - by 4 d ^s -	4 inside & 3 outside	five miles -	5 d.
Cork to Tralee -	Charles D. Oliver	- - - by 4 d ^s -	4 inside & 2 outside	five miles -	4 ½ d.
Kinnegad to Sligo -	Richard Bourne -	- - - by 4 d ^s -	6 inside & 3 outside	five miles -	7 d.
Limerick to Ennis -	Wm. Bourne -	- - - by 4 d ^s -	6 inside & 2 outside	five miles -	4 ½ d.
Limerick to Tralee -	Wm. Bourne -	- - - by 4 d ^s -	6 inside & 2 outside	five miles -	4 ½ d.
Newry to Dungannon -	Anderson & Green	- - - by 4 d ^s -	4 inside & 3 outside	five miles -	No specific sum per mile; but an annual allowance of 450 l.
Waterford to Cork -	Rhodol. Mortimer	- - - by 4 d ^s -	4 inside & 1 outside	five miles -	4 ½ d.

General Post Office, }
March 20, 1890. }

Hours of Dispatch and Arrival at and from Dublin.		PRINCIPAL TOWNS on the Line.	Hours of Dispatch, and Arrival at and from the Principal Towns.		By whom the Coaches are provided.	The Time each Contract has to run.	OBSERVATIONS.
Dispatch	Arrival.		Arrival down.	Dispatch up.			
8 P. M.	6 A. M.	Carlow - -	4 0 A. M.	9 30 P. M.	by the contractors, at their expense.	until 5 July 1823	The Sunday mail conveyed free of charge.
		Thomastown -	7 30 A. M.	6 0 P. M.			
		Waterford -	11 0 A. M.	3 0 P. M.			
8 P. M.	6 A. M.	Bray - -	9 45 P. M.	4 13 A. M.	- d ^e -	until 5 April 1827	The second mail guard, and Sunday mail, are conveyed free of charge.
		Rathdrum -	1 25 A. M.	12 23 A. M.			
		Arklow - -	3 25 A. M.	10 18 P. M.			
		Gorey - -	4 55 A. M.	8 28 P. M.	- d ^e -	no contract executed.	
		Ferns - -	6 37 A. M.	6 55 P. M.			
		Enniscorthy -	7 43 A. M.	5 47 P. M.			
		Wexford -	10 0 A. M.	3 30 P. M.	- d ^e -	no contract executed.	
		Antrim - -	2 35 P. M.	6 12 A. M.			
		Randalstown -	3 10 P. M.	5 37 A. M.			
		Ballymena -	4 35 P. M.	4 0 A. M.	- d ^e -	no contract executed.	
		Ballymoney -	7 50 P. M.	1 5 A. M.			
		Coleraine -	9 10 P. M.	11 30 P. M.			
		New T. Limavady -	11 40 P. M.	9 20 P. M.	- d ^e -	no contract executed.	
		Derry - -	2 0 A. M.	7 0 P. M.			
		Newton Ards -	1 20 P. M.	7 10 A. M.			
		Donaghadee -	2 30 P. M.	6 0 A. M.	- d ^e -	- - - d ^e .	
		Tuam - -	3 30 P. M.	8 48 A. M.			
		Hollymount -	6 30 P. M.	6 18 A. M.			
		Castlebar -	9 30 P. M.	3 30 A. M.	- d ^e -	- - - d ^e .	
		Westport -	11 11 P. M.	1 47 A. M.			
		Carrick on Suir -	8 10 A. M.	5 5 P. M.			
		Waterford -	11 0 A. M.	2 25 P. M.	- d ^e -	- - - d ^e .	
		Bandon - -	9 10 A. M.	2 35 P. M.			
		Cloughnakilty -	11 30 A. M.	12 35 P. M.			
		Skibbereen -	2 30 P. M.	9 30 A. M.	- d ^e -	- - - d ^e .	
		Macroom - -	9 37 A. M.	2 23 P. M.			
		Millstreet -	12 noon	12 20 P. M.			
		Killarney -	3 12 P. M.	8 44 A. M.	- d ^e -	until 5 Oct. 1827	Between Kinne- gad and Mullingar the mail is con- veyed by a coach carrying four in- side passengers, and drawn by three horses.
		Tralee - -	6 30 P. M.	5 30 A. M.			
		Mullingar -	4 0 A. M.	9 31 P. M.			
		Edgeworthstown -	6 35 A. M.	6 45 P. M.	- d ^e -	until 5 July 1829.	
		Longford - -	7 55 A. M.	5 6 P. M.			
		Carrick on Shannon -	11 40 A. M.	1 51 P. M.			
		Boyle - -	1 20 P. M.	12 11 P. M.	- d ^e -	no contract executed.	
		Sligo - -	5 6 P. M.	8 30 A. M.			
		N. Mark' or Fergus -	5 52 P. M.	7 48 A. M.			
		Ennis - -	7 10 P. M.	6 30 A. M.	- d ^e -	- d ^e - - - d ^e -	The coach has not commenced run- ning, in conse- quence of the un- finished state of the road.
		Rathkeale -	- - -	- - -			
		Tarbert -	- - -	- - -			
		Listowell -	- - -	- - -	- d ^e -	no contract executed.	
		Tralee - -	- - -	- - -			
		Market Hill -	7 35 A. M.	6 55 P. M.			
		Armagh - -	8 50 A. M.	5 40 P. M.	- d ^e -	until 5 April 1829	In consideration of the coach tra- velling at the rate of six miles an hour, two additional out- side passengers are permitted.
		Hay - -	10 15 A. M.	4 15 P. M.			
		Dungannon -	11 0 A. M.	3 0 P. M.			
		Dungarvan -	2 40 P. M.	5 40 P. M.	- d ^e -		
		Cappoquin -	3 55 P. M.	4 20 P. M.			
		Lismore - -	4 25 P. M.	3 20 P. M.			
		Youghall -	7 0 P. M.	1 5 P. M.	- d ^e -		
		Castlemartyn -	8 30 P. M.	11 45 A. M.			
		Middleton -	9 10 P. M.	11 5 A. M.			
		Cork - -	11 0 P. M.	9 15 A. M.			

J. Ferguson,
Surv^r & Sup^t of Mail Coaches.

Appendix, No. 2.

COPIES of all REPORTS that have been made to the Lord Lieutenant of Ireland, or to the Postmaster General, by persons employed by them to inspect any of the New Lines of Road which have been made under 45 & 46 Geo. III.

REPORT on the Expenditure on the Post Road between CORK and SKIBBEREEN, by order of His Excellency the Lord Lieutenant, in a Letter from Major Alexander Taylor and Sir Charles Coote, to the Secretary, General Post Office, Dublin; dated August 10, 1813.

SIR,

Dublin, 10th August 1813.

WE have the honour to acquaint you, that in obedience to the commands of their Lordships the Postmasters General, signified by your letter of the 12th May, we duly proceeded to inspect the new post road between the city of Cork and the town of Skibbereen, and have made a re-survey of the same, in order to enable us to give the valuation you require, as well as to distinguish the deviations which have been made from the original Presented Line, which you will perceive are very considerable, and are marked by a red line on the several maps; as also to show the degree of progress, in detail, in which we found the works, which was extremely irregular throughout every mile, some portions being scarcely formed, and others further advanced, and occasioned so extended an estimate in detail as is forwarded herewith.

We judged it necessary that Mr. Larkin should accompany us on our inspection, as having been the surveyor who laid out, and also lockspitted the original presented line; but as the point seemed to be at issue between him and Mr. George Kingston, of Bandon, who was the accounting overseer of the entire road, and who complained of Mr. Larkin's inaccuracy, and of the deficiency of his estimate, we were of opinion that no part of the re-survey of the original line, or of the deviations therefrom, should be made by him, as being an interested person, but that he should accompany us on the ground, merely to explain all matters which we should find necessary to inquire of him.

To avoid prolixity, we beg leave to refer you to our observations in a distinct column of the estimate on the several works gradatim, and you will please to observe, that the deviations from the original presented line of road are also particularized therein.

We conceived it our duty to wait on Lord Carbery, to make inquiry respecting this subject, as having been the general overseer with whom the Government had corresponded; and his lordship was pleased to inform us that he was not in possession of the reason for the several deviations throughout the line, but only for that particular one at Rosscarberry, marked N^o 9, on the maps B and C, which was in consequence of the grand jury having made separate presentments for it; that Mr. Larkin's line between the town of Clonakilty and the east end of the causeway at Rosscarberry was adopted by the grand jury, and that from thence, round the shore, and so far as Mr. Morris's deer park, west of Rosscarberry, Mr. Larkin's line was rejected.

That there were two presentments for a causeway across the strand at Rosscarberry* commencing at the east end of the strand, and ending at the old malt-house in the town, which was originally presented to have been but thirty-two feet wide, but was made forty-two in width, to bring it to the full breadth specified in the Post Road Act: That the original presentment comprised that part of the strand which is now the causeway between the eastern and western shores, but his lordship did not state the amount presented for that work: That there was a subsequent presentment for a continuation of the causeway from the eastern end of the bridge skirting the shore to the old malt-house, for which about 1,200*l*. (in round numbers) was granted: That no part of the two sums of 25,128*l*. or of 9,000*l*. which were the post-road funds, had been applied to this work: That the continuation of the deviated line from the old malt-house to the junction with Mr. Larkin's line, in Mr. Morris's deer park, nearly two miles farther, was made by another presentment, of which Mr. Horace Townsend was the overseer: That several sums which had lain over from time to time in the treasurer's hands were re-presented for the purpose of making this part of the deviation; and that also a part of the post-road funds were applied for this purpose, though his lordship did not know of any presentment having been made to warrant it, the particulars of

* Lord Carbery has informed us, on this paragraph having been read over before the grand jury, that previous to Mr. Larkin's line having been considered at Spring Assizes 1810, a sum of 1,000*l*. was granted to him to make the causeway, in two presentments; and that on the substitution of that line of which the causeway is a

part, in place of Mr. Larkin's line round the shore, the causeway and the continuation of it having become a part of the post road, his lordship received a part of the post-road fund, to the amount of about 1,400*l*. (in round numbers), which was applied to that purpose.

which

which Mr. Horace Townsend could explain. His lordship mentioned his having written to Mr. Delacour, the county treasurer, to Mr. Jack the secretary of the grand jury, and to Mr. Kingston, the accounting overseer, requesting that every information might be given to us which we might require in our inspection. We were not so fortunate to meet Mr. Horace Townsend after Lord Carbery's communication to us, as he was that day from home, and our time did not admit of delay, but from the particulars subsequently explained by Mr. Kingston some judgment may be formed respecting this subject, which will be stated just now.

The most important and expensive deviation comparatively for its length, and to which we must point your particular consideration, refers to the column of observations in our estimate, ante page 53, and is marked on the map B. N° 3, immediately departing from the old market-house of Bandon, and through the western suburbs of that town.

This deviation has caused an unnecessary expense of above 650*l.* The course of a stream, called the Bridewell River, has been changed at an immoderate expense, and increased length, beyond Mr. Larkin's estimate; a new watercourse excavated and walled in, and the old course, which is now the line of road, has been filled up, by which means the presented line of road which runs parallel to the present line has been thrown into a plot of building ground, the property of Mr. George Kingston, the accounting and directing overseer.

You will perceive that the fences in Mr. Larkin's estimate along the presented line are only rated at 1*s.* 6*d.* per perch lineal, and our valuation will show, that where an earthen parapet or fence of the value of 2*s.* per perch was sufficient between the road and the field, a wall of the most solid and massive mortar masonry has been erected at the public expense in the town of Bandon, opposite the mill, and appears as if it was intended for the foundation and the ground-story of an extensive building, and which the proprietor of that plot of building ground so inclosed may doubtless avail himself of when he thinks proper. Mr. Kingston admitted that this plot is in his possession, and is the property of his grace the Duke of Devonshire.

Mr. Kingston did not give any satisfactory reply, nor did he produce his ledger, or any voucher to confirm his accounts, which had been asked of him to exhibit; and as Sir Charles Coote did not get the information he required, and which he was led to expect from Lord Carbery's letter to Major Taylor, a copy of which is enclosed, marked N° 2, in answer to major Taylor's letter, (copy enclosed) marked N° 1, he therefore left Mr. Kingston.

You will perceive the inconsistency in Mr. Kingston's admission in his answers, that the grand jury never inspected his accounts, which the presentment N° 7, implies they have done; as their opinion was, "that he had faithfully and laboriously discharged his duty as an overseer, and was worthy of the confidence of the county."

Mr. De la Cour informed us he thought it necessary to require from Mr. Kingston at all times an affidavit of having duly and faithfully expended the prior sums which he had advanced to him, before he made a further advance; and that he transmitted such affidavits regularly to the Lord Lieutenant, when he applied for an advance from the treasury on account of the post road; and that such affidavit was accompanied by another, made jointly by himself and Lord Carbery, the general overseers (he Mr. De la Cour having been made an overseer *pro forma*), which stated their belief that Mr. Kingston had faithfully and duly expended the former advances; and Mr. De la Cour swore therein that he had handed to Mr. Kingston all the money which had come into his hands for that purpose. Mr. De la Cour explained to us that a commission of half per cent. was stopped by Messrs. Croker and Darling, merchants in Dublin, whom he authorized, by letter of attorney, to receive the money at the Treasury on his account, and that that commission, and some trifling fees paid at the Treasury on each advance, were the only deductions out of the two sums of 25,128*l.* and 9,000*l.* which he drew and paid over to Mr. Kingston from time to time. He said he had explained to Sir Charles Saxton the personal inconvenience to him of being obliged to receive this money at the Treasury, and that Sir Charles pointed out the mode of receiving it by another person, whom he, Mr. De la Cour, should duly appoint by letter of attorney.

You will observe, the latter paragraph in paper N° 6, states the reason of superseding Mr. Kingston in the overseeing of the Skibbereen line, as having too much road for one person to direct the works of, as Mr. Kingston is also overseer of the Bantry mail-coach road, about twenty-five miles in length, which branches from the Skibbereen road, a short distance west of Bandon; the money for this line has also been advanced by the Lords of the Treasury, and Mr. Kingston stated, that the works on this line are considerably more backward than those on the Skibbereen line; but we did not make any survey or valuation thereof, as our instructions did not warrant it, or our time admit of it.

Respecting the long deviation from the site of Priests Bridge to Innishannon, which Mr. Kingston is of opinion saved the county 10,000*l.* we got it duly surveyed, and we find it is five furlongs shorter than Mr. Larkin's line.

Mr. Larkin's line passed, for some distance from its commencement at Priest's Bridge, through a bottom liable to floods, but which he estimated should be raised; and the adopted line has been raised as high by excavation from the trenches at either side, and at as much expense, as was estimated for the other, in proportion to its length. At the commencement of the adopted line the ground was actually lower than that of Mr. Larkin's, as we ascertained by the levelling instrument. It appeared formidable to make a road through the flooded bottom; but it would not have been attended with difficulty or much expense, as the ground was a gravelly bottom, with a few inches of mud on the surface, brought down and deposited there by the floods. The excavation at either side from the dykes would have raised it sufficiently above flood mark, without any cost of carting earth to it.

The money which has been taken from the post-road funds to pay damages to Sir John Millar's tenants, although the tenantry on the rejected line had been previously compensated, should be charged to the debit of this line, after which there would be a saving to the county, in favour of the adopted line, of 250*l.* or thereabouts. Though the latter line is evidently less expensive, and five furlongs shorter than Mr. Larkin's line, and has in these respects the advantage over his, yet according to a survey made by B^r Meredith of it, by our directions, it appears there are no less than eight deviations on it, under the standard directed by the post-road statute, of a rise and fall of one foot in a length of thirty-five feet, one of which is so considerable as one foot in a length of nineteen feet, and another as one foot in a length of twenty feet; whereas the whole of Mr. Larkin's line is within the standard of one foot in thirty-five, excepting in one place, where it varies in the proportion of one foot rise and fall in a length of twenty-seven feet. It should also be taken into account, that as the adopted line is five furlongs shorter than Mr. Larkin's, the cost of making these five furlongs ought to be now in hands, as Mr. Kingston has drawn the whole of the original presentment of 25,128*l.* in which the cost of these five furlongs was included.

To the charge made against Mr. Larkin by the grand jury of the county Cork, respecting the inaccuracy of his estimate, we are of opinion it is not only inaccurate, but that it is very insufficient in the detail. We perceive an average rate charged for his bridges of about 10*l.* per foot, for every foot span in the arch, which on the general total in that article, throughout the line, is not far distant from the truth, but almost every where is incorrect as to the particular item it refers to. We find he omitted to give in a ground-plan, elevation, and detailed estimate of each of his bridges, which there is no excuse for, as he would have been entitled to payment for that trouble; and although his lines of road in general are admirably chosen, through an extensive, wild and difficult country, which part of the work has been entirely his own particular labour, and which does him infinite credit, yet we are of opinion that his estimate was incorrectly formed.

We think it right to mention, that we were informed by a gentleman* of that grand jury, who examined and approved of Mr. Larkin's designs and estimates, when he first submitted his map to their consideration, that he was asked by the foreman, Would he engage to make and complete the Skibbereen road for the amount of his estimate? and his reply was, that although he never had in contemplation such an undertaking, yet so confident he was that he had allowed sufficient money in his estimate for the completion of all the works, that he *would engage* to do every thing requisite for that sum, and find security for his due performance, which the grand jury did not think proper to contract with him for.

You will find in the column of observations in our estimate, we have stated in detail the information we received casually on the ground, which we beg leave to refer you to, and which it must be remarked was given by persons of perhaps doubtful credit, who had been employed in the several works on the road, and were parties concerned, with whom it might not be easy to satisfy their demands, and almost all of whom claim money to be due to them for their labour, and in some places, we think, from their own statement, they were paid more than their work deserved.

Respecting the works on the line between Innishannon and Bandon, which seem to have incurred a serious expense, we beg your attention to our remarks, in observations of our estimate, ante, p. 53, as Mr. Kingston dwells considerably on this expenditure.

In order to strike a balance generally on the amount of works *executed*, and works *required* on that part of the line which is within the county of Cork, we submit the following statements:

First sum presented for this purpose at summer assizes 1810, and	£.	s.	d.
which Mr. Larkin estimated to have been fully sufficient for every purpose -	25,128	17	-
Second sum presented at spring assizes 1812, the former sum being alleged to be sufficient -	9,000	-	-
A third sum presented at spring assizes 1813, for the like purpose -	12,000	-	-

Making in toto, the sum of - - - £. 46,128 17 -

By our estimate, we value the works executed to amount to -	18,560	7	4½
From which should be deducted, useless or unnecessary expenditure -	2,296	2	10

Remains the sum expended for which there is value - - - £. 16,264 4 6½

See note (a) } Add to this the amount of works required by our estimate to complete the line (exclusive of the forming of footpath -

P 91 - } 11,037 18 1

The total will be the sum, which would have been sufficient at the commencement for every purpose - - - £. 27,302 2 7½

* Mr. Courtney was the gentleman with whom we had the conversation on the subject; he now says we misconceived him; that he had heard, and he believes his information was from Mr. Larkin himself, that such a question was put to him; and he recollects, that after the work had

been in progress, at a subsequent examination before the grand jury, that Mr. Larkin had been asked such a question; and it was always the general impression with Mr. Courtney, that Mr. Larkin was at all times ready to execute the work, had he been employed.

	£.	s.	d.
From the presented sums, making together - - - - -	46,128	17	-
Deduct our valuation as above - - - - -	27,302	2	7 ½
The remainder will be - - - - -	£. 18,726	14	4 ½

Which is so much more than (we are of opinion) was requisite for every purpose.

We find that Mr. Larkin's estimate was less than ours by 2,173*l.* 5*s.* 7 ½*d.*, but we admit ours to be a high estimate.

We must here remark, that it will yet require 1,901*l.* 3*s.* 6*d.* to form and shape a footpath on this line*, no part of which is yet made, which expense might have been saved if it had been formed at the same time with the shaping of the road, and which we have therefore added to the column of unnecessary expenditure, which is particularly explained in observations, ante, p. 53; and in recapitulated estimate.

As the presentment for the sum of 12,000*l.* granted at last spring assizes, the sum of 1,500*l.* will of course be raised prior to the ensuing summer assizes, and which is so much in hands towards the completion of the works in the county, so that the balance required for that purpose will be but 11,439*l.* 1*s.* 7*d.*

The better to form a comparative opinion, whether the sums estimated by Mr. Larkin for the other post roads which he designed and surveyed within the county of Cork, were adequate to the expense, we judged it necessary that we should view these roads, and commenced with the new line now making between the city of Cork and Kinsale, which branches off from the Skibbereen road near Priests Bridge, without making any detailed survey or valuation of the works; and we saw Mr. Meade, the general overseer of that line, a gentleman of fortune and respectability, who acquainted us that he expects to be able to complete that road for the original estimated sum, so far as he has gone having found the estimated sum sufficient; the materials along this line, and the features of the country through which it passes, are very similar to those of the Skibbereen road.

We also viewed the new line from Cork to Limerick by Mallow, part of which Mr. Larkin undertook to make by contract for the amount of his own estimate, the execution of which is unexceptionable.

We further viewed another road, surveyed and estimated by him, between Fermoy and Middleton, and which has been just finished by contract, at the amount of his estimate, though we think it is not sufficiently gravelled. We saw the contractors, who accompanied us along the whole line, and admitted they had completed the road for the estimated sum, in which the usual sum of five per cent. for overseer's wages was not allowed; and it must be observed, that this line has been more expensive and difficult in proportion to its length, than any other of Mr. Larkin's lines throughout this county.

The additional sum of five per cent. would complete all the works. The new bridges on this line are thirty-four feet wide, and those on the Skibbereen line but twenty-four feet.

Mr. Kingston asserted, as an argument against (as he alleges) the very considerable inadequacy of Mr. Larkin's estimate for this road, that his charge on his other estimates for mail-coach roads (including all the works), averaged 1,000*l.* per mile, for every mile of new road; and that on the Skibbereen line, which town is nearly forty-two miles distant from Cork, but 25,000*l.* was estimated for the completion of all the works, having been only at the rate of 600*l.* per mile. But this is not the *fact*, the distance from Cork to Skibbereen is forty-one and one-half miles, from which should be deducted the following distances, not included in Mr. Larkin's estimate of 25,000*l.*; viz. From the exchange of Cork to the bounds of the liberties of Cork, for which there was a separate estimate laid before the city grand jury, and the distance between these points making

	M.	f.	p.
Viz.	5	-	33
From the east end of Innishannon to the west end thereof, the repairs or improvements of which are not set down in estimate - - - - -	2	-	35
From the junction of new line entering at the eastern suburbs of Bandon, and from thence to the narrow bridge in the town, not included in estimate - - - - -	-	3	2
From the narrow bridge to the market-house of Bandon - - - - -	-	1	1
From the east end of Clonakilty, where improvements end, to the west end, where the new road commences, not in estimate - - - - -	-	3	3
From the east end of the causeway at Rosscarberry, to the junction with Mr. Larkin's original line in Mr. Morris's deer park, not included in estimate - - - - -	2	4	9

(a) To amount of works required - - - - -	£. 11,037	18	1
* Add cost of forming a footpath, to be yet done - - - - -	1,901	3	6

Sum total now required to complete the works within the county on Mr. Larkin's line, exclusive of the deviation from the east end of the causeway at Rosscarberry to Mr. Morris's deer park - - - - -	12,939	1	7
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	M.	f.	p.
From the east end of Skibbereen, where the improvements end, to the market-house of Skibbereen	-	1	20
From the distance between Exchange of Cork and market-house of Skibbereen	41	4	-
Deduct the foregoing distances not included in the estimate	-	9	- 23
Remains miles	-	32	3 17

Total rated in estimate to be improved	-	-	-	M. f. p.	32	3	17	{ and will average about 812 <i>l.</i> per mile.
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It must be considered that for these 32 m. 3*f.* 17*p.* which were to be improved, there were no less than 6 m. 6*f.* 17*p.* old road to be retained and widened, for which there must have been at least one half less cost allowed in the estimate than if it was all a new road for that distance, which would increase the average cost per mile to about 870*l.* for every mile of new road, as by the following calculation :

	M.	f.	p.
Distance as above, not in estimate	-	9	- 23
Add half the distance of 6 m. 6 <i>f.</i> 17 <i>p.</i> of old road, which was to be retained and widened	-	3	3 8
Total miles	-	12	2 31
From full distance between Cork and Skibbereen	-	41	4 -
Deduct as above	-	12	3 31
Remains miles	-	29	- 9

Say equal to twenty-nine miles of new road throughout the line, which will average about 870*l.* per mile.

Mr. Kingston informed us, that Mr. Larkin has stated there was a clerical error in his estimate of 1,000*l.* underrated in the cost of Ballyhassig bridge; doubtless this bridge was underrated; whether the error was in the calculation, or clerical, if the latter, there would be 1,000*l.* additional to the amount of the estimate, which would average that part of the road which is *new* to above 900*l.* per mile.

We have already stated, we consider our estimate a high one, and we think the works ought to be well executed for the money we have allowed.

We do not in this calculation include overseer's wages of five per cent.; that sum should be the contractor's profit, and he should actually expend the amount of estimate.

As the balances we have already stated relate only to that part of the Skibbereen line contained in the county of Cork, we refer you to our estimate, ante, p. 63, for so much of this line as is within the liberties of the city of Cork, by which you will see it requires the sum of 1,984*l.* 2*s.* 5*d.* to complete the works in that district.

Mr. Philips, the city treasurer, has furnished us with a statement of his accounts, together with a copy of Mr. Kingston's accounts in his district: *viz.*—

	£.	s.	d.
Amount of original presentment of city grand jury	-	-	3,000 - -
Deduct sums advanced thereout to Mr. Kingston	-	-	2,750 - -
	£.	250	- -

We value the total expenditure of works already executed to amount to	874	6	10
Add five pounds per cent. on this sum, as overseer's wages	-	44	14 4
Amount	-	£. 919	1 2
From which should be deducted useless or unnecessary works	-	76	11 -
Remains works for which there is value	-	£. 842	10 2

In Mr. Kingston's accounts he alleges to have already expended on this part of the line, including overseer's wages, the sum of

	£.	2,455	17 5
From which deduct valuable expenditure	-	842	10 2
Remains sum alleged to have been expended, for which we cannot see any value whatever	-	£. 1,613	7 3

Amount

Amount of works required as per our estimate, to complete the line within the city liberties, from the Exchange of the city of Cork to the bounds of the county of Cork and city liberties	£.	s.	d.
	1,984	2	5
Deduct the sum as above, in treasurer's hands, remaining out of original presentment	250	-	-
Balance requiring to be yet raised to complete the works on this line	1,734	2	5
Deduct further the amount of works required from the Exchange of city of Cork to the commencement of the new road on the town land of Bishopstown	1,022	10	7
Remains sum required to be yet raised to complete the works on that part of the road which is entirely new*, (comprising the original presentment,) viz. from the town land of Bishopstown to the bounds between the county and city liberties	£.	711	11 10

It will be scarcely necessary for us to remark any further on the impossibility of admitting Mr. Kingston's accounts, without he gives some corroboration, which has in no shape been attempted, except by the affidavit furnished at Mr. De la Cour's suggestion; but lest it should be thought proper by the Government, or by the grand jury, to bring him to account in due form, we have transferred his several accounts into his ledgers†, regularly compiled therefrom, and forwarded herewith for your inspection. We have charged to each person's account the sums stated in detail in those accounts to have been paid to them.

We have arranged under distinct heads the several items for masonry, materials, implements, &c. which will greatly facilitate and expedite the inquiry, should it be judged expedient.

You will, ere this, have perceived our opinion of the works on this line, which is also more fully expressed in the estimate.

We think the materials in the masonry of the bridges are generally of the best quality; and the workmanship is equally so, and promises to be very durable, but the *projection* and *designs* are ridiculously massive and unnecessarily expensive‡.

You will find in the estimate, we as fully condemn the sewers, tunnels or gulleys throughout the line, being insufficient both in workmanship and design.

In order to give an explicit answer to the queries contained in your letter, we are of opinion that the original line which was approved of and presented by the grand jury was unnecessarily departed from.

That the expenditure has been improvident; that the money has not been properly accounted for; and we conceive the cause of the exceeding of the expense above the estimate was in consequence of the money which was granted not having been duly expended on the specified and intended purposes; and in some cases that no part of such sums was so applied as the works for which they were estimated have not yet been commenced.

The whole of the money hitherto advanced by Government is alleged to have been expended on the works in their present unfinished state; and Mr. Kingston, the accounting overseer, claims a balance due to him for his advances over these sums in the county of Cork, amounting to 316*l.* 5*s.* 2*d.*

All which statements we humbly beg leave to submit to the consideration of their Lordships the Postmasters General.

And have the honour to be,

Sir,

Edward S. Lees, Esq.

&c. &c. &c.

(signed)

Your most obedient and most humble servants,
Alexr Taylor,
Charles Coote.

Dublin, August 10th, 1813.

* That part of the present line of retained road between city of Cork, commencing at the Exchange, and ending at the commencement of the new road on the town land of Bishopstown, was not included in the presentment of 3,000*l.* which sum was granted for the works on the new road only, viz. between Bishopstown and the extreme end of the liberties.—Mr. Philips has informed us, Mr. Kingston is yet the overseer of this line, within the liberties of the city of Cork.

† One of those ledgers contains his accounts within the county, the other within the liberties of the city of Cork.

‡ At Ballyhassig bridge, where a wing-wall was to be built about four feet in height, we found men employed quarrying a deep foundation for this wall, out of the solid rock, for a great length, as if a wall could be stronger than the rock which was excavated, to be replaced with masonry.—See ante, p. 63.

REPORT on the Expenditure on the Post Road between the Towns of KILLARNEY and TRALEE, by order of His Excellency the Lord Lieutenant, in a Letter from Sir Charles Coote to the Secretary, General Post Office, Dublin; dated 10th February 1815.

Sir,

Dublin, 10th February 1815.

IN obedience to the commands of their Lordships the Postmasters General, which I had the honour to receive through you, that I should, "for the information of his Excellency the Lord Lieutenant, inquire into the circumstances which have rendered any addition to the original estimated expense requisite on the new post road between the towns of Killarney and Tralee, and also to report what further sum it will be necessary to advance in order to complete the road," I have now the honour to acquaint you, that I have duly examined the works thereon, as will appear by the enclosed valuation and estimate, which detail both the value of the expenditure on the works executed along the line, and also what sums will be required for each portion of the road to complete it. I have carefully compared the original estimate, a copy of which I received from the proper officer in Tralee, with the works now executed thereon; and I am of opinion that the amount of that estimate was fully equal to have completed the road, if the conducting of it had been in the hands of persons of sufficient skill in such works.

I beg leave to remark, I have minutely examined the overseers accounts, which they voluntarily furnished me with, and that they sent their clerk to accompany me in my inspection, to explain any matters I might require. These accounts, though not kept strictly as the statute provides for, yet there does not appear any thing complex, or more confusion therein than might be expected, and which do not afford any specific grounds to suspect that the sums claimed to have been expended have not actually been so.

It appears by two documents I received, certified by the deputy clerk of the crown and the treasurer of the county, that the post office survey and estimate for the road were first laid before the grand jury of Kerry at spring assizes 1811, amounting to 10,612*l.* 2*s.* to complete it forty-two feet wide in the clear of the fences; but that former grand juries had long prior to this period determined on making a road thirty-two feet wide only, partly in the same direction as was afterwards adopted by the post office surveyor; and that at spring assizes 1809 a sum of 1,343*l.* 13*s.* 3*d.* was to be accounted for, being the amount of the presentment of prior grand juries for that purpose; of which sum, 849*l.* 3*s.* 2*d.* was then allowed to have been justly expended, and the queries thereof discharged; and that a sum of 499*l.* 16*s.* 3*d.* was re-presented, but it does not state for what purpose; these two sums added together exceed the presented sum in the amount of 5*l.* 6*s.* 2*d.*; probably an error. From the same document I find, that at Spring affizes 1810, a further sum was to be accounted for, amounting to 1,168*l.* 11*s.* of which only 121*l.* 4*s.* was then allowed to have been expended, and the query thereof was discharged; and that 1,047*l.* 16*s.* 6*d.* was re-presented at the same time, but not stating for what purpose. These two latter sums added together also exceed the presented sum by 9*s.* 6*d.*; probably another error.

I find by the memorial from the grand jury at last spring assizes, to his Excellency the Lord Lieutenant, praying for the investigation which I have now the honour to report on, that the grand jury for Summer 1810 forwarded a memorial to the Postmaster General, praying that their Lordships would direct that a survey should be made of the proposed new road, together with an estimate thereof, to be laid before the grand jury at Spring 1811; from which circumstance I conclude they (very properly) were unwilling to continue to present large sums for this line, without being satisfied it was in the proper direction, and without knowing what ought to be the amount of the actual required expense, and probably with a view of getting the necessary sums advanced by the Lords of Treasury, which they would be entitled to under the statute.

The Postmasters General were pleased to comply with the memorial, and Mr. Larkin accordingly surveyed a line, and estimated the expense of it.

I did not see a map of the previously adopted line as presented in Spring 1809, therefore I cannot say how far Mr. Larkin found it necessary to deviate therefrom, or what was his reason for rejecting any part of it; but I find by his estimate that he occasionally adopted the original line, and rejected much the greater part of it; and where any of it was retained, he gave credit in his estimate for so much as the value of the works then executed thereon, by setting down only what sum was necessary to complete it to the required breadth of forty-two feet.

I find the presentments granted at spring assizes 1809 and 1810, previous to the post office survey having been made, amount together to 2,512*l.* 4*s.* 3*d.*, and that the total allowed to have been expended, and which was accounted for, amounted to 972*l.* 7*s.* 2*d.*, and that 1,547*l.* 12*s.* 9*d.* was re-presented very probably towards completing the road according to Mr. Larkin's design, or in other words, taking credit for so much in hands towards his estimate; this supposition is strengthened in the grand jury continuing the overseeing of the road in the hands of P. O. Ellard, esq. the same general overseer who had originally been appointed previous to Spring 1809, and also with C. D. Oliver, esq. who became an additional general overseer for the sums accounted for at Spring 1810. I find from the same documents, other names are amongst the overseers for the several presentments of Spring 1809 and 1810; but it appears, these two gentlemen were the
general

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general managing and directing overseers, and that the expenditure under Mr. Larkin's estimate was altogether committed to their care.

I have already stated that Mr. Larkin's estimate amounted to 10,612*l.* 2*s.*; and I learn from these documents, that at the time the grand jury presented the new road at Spring 1811, in conformity to the post office survey, they took credit, or deducted from that estimate, the sum of 635*l.* 6*s.* being the amount of what was set down therein for widening and repairing two hundred and two perches of the old road between the town of Killarney and the branching off or junction therewith at the commencement of the new road on the land of Mount Meredith; probably they were of opinion such improvements as he suggested upon so much of the retained road were not necessary, and that the balance which was 9,976*l.* 16*s.* together with its per-centage for overseers wages, viz. 498*l.* 16*s.* 6*d.*, making together 10,475*l.* 12*s.* 6*d.* was presented to be raised in twelve successive assizes, and the sum of 872*l.* 19*s.* 4½*d.* being the one-twelfth part thereof, was ordered to be raised prior to the then next ensuing assizes. It also appears by Mr. Gregory's letter to the Postmasters General ordering this inquiry, that the balance being 9,602*l.* 13*s.* 1½*d.* was advanced by the Lords of the Treasury, which sums it is stated in the memorial of the grand jury of last spring assizes to his Excellency the Lord Lieutenant, "*were duly expended, and found insufficient to complete the road.*" This assertion of the grand jury warrants the supposition that the accounts of the general overseers were duly examined by them, as they say "*the sums were duly expended and found insufficient.*"

I find by the said documents, certified by the deputy clerk of the Crown and Treasurer of the county, that several sums were required by the general overseers in addition to Mr. Larkin's estimate, and that further presentments have been made up to last summer assizes for that purpose, to the amount of 1,469*l.* 17*s.* 7½*d.* that the sums presented since spring 1811 are 11,945*l.* 10*s.* 1½*d.*, and previous to that period 972*l.* 7*s.* 2*d.*, making in toto, 12,917*l.* 17*s.* 3½*d.*; and you will find in my valuation of the column of works now required to complete the road, that the amount is 4,656*l.* 19*s.* 7*d.*, which if presented will make the sum total amount to 17,574*l.* 16*s.* 10½*d.* for a line of road fourteen miles three furlongs and thirty-two perches in length, two portions of which were old road to be retained and widened, and upon which whole line no extraordinary expense was requisite, except through Barry's Glyn.

You will find in my estimate that the value of works already executed amount to 7,506*l.* 2*s.* 8*d.* only; deduct this sum from the amount of the sum expended, and of that required to complete the road as before stated, together 17,574*l.* 16*s.* 10½*d.*, and the balance is 10,068*l.* 12*s.* 2½*d.* which it will have cost the county for the short time it has been travelled upon, or in other words, that is all the value they have got for this large sum: to this should also be added the per-centage for overseers wages on the amount of the costs of works required, which increases the sum above 230*l.* additional; this you will allow is another manifest proof, to the many you have already had, of the insufficiency of the post-road Statutes in not having provided for the proper application of such large sums, and the not intrusting the expenditure in the hands of skilful and experienced persons for works of such great and national importance.

It becomes my duty to remark, that it appears from these documents I have throughout this report alluded to, and which have been my guide in this inquiry, that a *deviation* was made from the original presented line; as I take it for granted, that when the grand jury presented the sum set down by Larkin to complete his designed improvements, they consequently must have adopted the line he suggested and estimated upon, in which a new line entering the town of Tralee was provided for, and which has not been adopted; but, I understand from Mr. Oliver, one of the general overseers, that he and Mr. Ellard would not undertake the overseeing of this deviation; and that they did not direct the works farther than the commencement thereof. If there has been any presentment passed describing the course of the road, and the number of perches in length through which it was to pass through each townland, as there should have been, at the same time that the amount of the estimated expense was presented, I have not been furnished with a copy thereof; but the grand jury having presented the amount of Larkin's estimate warrants the conclusion that they must have approved of his design, and confirmed it by such presentment, although they might have omitted to pass the necessary and required descriptive presentment.

From this statement, you will probably think it difficult to reconcile it, that there has not been more than a want of sufficient skill and experience to occasion so great a deficit; yet upon examining the accounts of the general overseers, furnished to me by their clerk, and his willingness to go into the accounts, and offer to prove every item charged therein by sufficient documents and vouchers, and the overseers having at all times (when they had an opportunity) agreed with contractors to pay the several sums set down in Mr. Larkin's estimate for each work valued therein, that is, when they could find persons to contract for these works, at such stipulated prices, and particularly upon the building of bridges and masonry, upon which a saving might more probably have occurred, I confess I cannot find any specific grounds to draw such conclusion; but in order to give every facility to a minute investigation of these accounts, if the grand jury at the ensuing assizes should deem it necessary to re-consider them, I have reduced them from their confused state, and compiled them in a ledger, under their respective heads, which can be explained to them.

It must also be taken into consideration, that where so much of the expenditure was for days works, where very little real value or labour is given for the wages on public works, and that in the article of horse-hire, where their cattle and carriages, and all their imple-

ments are so very insufficient, there must be a great and corresponding loss, and we must allow, will account for a large portion of the deficiency; and further, it will be admitted, that when these public works are not executed by contract it is almost impossible to detect fraud, which possibly may be attempted, and the system is ruinous; but in this I speak generally, without any allusion to the case before us.

I confess I do not find any interested or partial expenditure along this line or deviation, which could have answered any sinister purpose, such as lately came under your observation; the deviation entering Tralee, being the only one, and probably adopted by the grand jury with a view to save the county the extraordinary costs of the damages through the town-parks, through which Mr. Larkin's design passed, and which would have borne a high valuation; though it appears to have been illegal, as they presented the money for his original design through these parks.

I beg leave to state, that I have set down in my estimate the quantity of gravel or broken stone which each detailed portion of the road will require; and I would recommend that any person with whom the grand jury may contract should be bound to apply the specified quantity to every perch along the line, if they should think proper to make a presentment upon my valuation.

Respecting the masonry along the line, the exterior of bridges seem tolerably good rough rubble work; but from a sample I had an opportunity of seeing within these two or three years past of the grossest imposition in the interior of the abutments of a bridge in that county, I would not venture to pass an opinion on such works generally, from their outward appearance. The pipes or gulleys are invariably badly built and ill constructed, all of them requiring to be rebuilt and widened, and many of them already choked, and incapable of discharging the water now lying on the surface of the road.

Upon the whole, I am therefore warranted in stating, for his Excellency's information, that from the documents I have seen, and on comparing them with the works upon the road, I do not find any thing deserving of more reprehension than that the works have been executed in a slovenly and ill-judged manner, without skill or good management; and that in no case has the value thereof equalled the alleged expenditure; and I take the liberty of suggesting, that if it should be deemed expedient to make a further advance from the Treasury to complete this road, that the works should be executed by contract, and not by days work.

Edward S. Lees, Esq.
Secretary, General Post Office,
&c. &c. &c.

I have the honour to be, Sir,
Your most obedient servant,
(signed) Charles Coote.

REPORT on the Expenditure on the Post Road, between TARBERT and TRALEE, by order of His Excellency the Lord Lieutenant, in a Letter from Sir Charles Coote, to the Secretary, General Post Office, Dublin, dated March 1st 1817.

Sir,
Baggot Street, Dublin, March 1st, 1817.
I HAVE the honour to acquaint you, for the information of his Excellency the Lord Lieutenant, pursuant to the orders of their Lordships the Postmasters General, conveyed in your letter, that in obedience thereto I proceeded to the county of Kerry, and have made a minute valuation of the expenditure, which now appears on the new post road between Tarbert and Tralee, as also an estimate of the sums required to complete the works, which are sent herewith.

I have valued the works executed in detailed lineal perches, and on the opposite page the estimate of sums required to complete the same, with a column for observations to each page, in a similar manner as the Skibbereen valuation and estimate was executed, which I understand was satisfactory.

It appears by the returns furnished me by the county treasurer, that 20,167 *l.* 4*s.* 8½*d.* has been granted at different periods, from Summer 1810 to Summer 1815, for this road; and that of that sum but 212 *l.* 17*s.* 4½*d.* remains in his hands. The amount of the original post office estimate was but 16,179 *l.* 4*s.* 6*d.*, and the excess already paid to the overseers beyond the estimate amounts to 3,775 *l.* 2*s.* 10*d.*, according to the return made to me by the county treasurer, but the report of the grand jury makes it 10,309 *l.* 7*s.* 7½*d.*

You will, by inspection of my valuation and estimate, see that I do not find value for more than 10,102 *l.* 15*s.* 3*d.*; and that it yet requires 10,997 *l.* 0*s.* 4*d.* to complete the works.

I have also to remark, that the works on this road being in progress since 1810, and no care having been taken to prevent travelling on it before it was finished, it is impossible to ascertain at this period what has been the value of the actual expenditure since the works were commenced. I can only give credit for what I find of value, on the presumption that the road is to be immediately finished, and that it is for such purpose this inquiry has been applied for by the grand jury; yet I have no hesitation in saying, that all the money granted has not been applied, because in many parts of the road there has been little or no work done, and in some parts none at all, which I have remarked particularly on, in the column of observations in the valuation and estimate. But it is very necessary to explain that a considerable portion of this road passes through deep soft bogs, upon which it is impossible at this period to ascertain what has been the expenditure; for if the sums alleged

alleged to have been laid out were actually so, they are totally lost, from the injudicious application of materials before the bogs were sufficiently drained. Upon that portion of road between Tarbert and Listowel there has been a great expenditure, and it is almost entirely of this description of deep soft bog, although it certainly was a very expensive line to make, if even in the most experienced hands; yet had this road been sufficiently drained before gravelling some thousand pounds of the alleged expenditure might have been saved. It seems to have been worked with great industry; but parts of it are now of quite a concave shape, from the road having been sunk in the centre by being travelled on before it was well drained, and which operation of draining requires yet to be performed, or it will soon burst and break up altogether.

The deviations throughout the entire road are trifling, and generally an improvement, and were almost all sanctioned by the grand jury previous to their granting the presentments, all which was quite regular and legal. Some of these deviations, which are particularly noted, save a great expense; and of course the difference of the money estimated by the post office surveyor for the expensive line, and the full amount of which was allowed to remain with the overseer for the cheaper substituted line, ought to be accounted for; but I am informed that many of the deputy overseers are dead, or insolvent, so that there is no probability of obliging them to refund.

Should the required sums not be applied the ensuing Summer, the damage will be so great by the next Winter as will make it impassable, and will require a much more considerable sum than is now necessary.

I cannot forbear repeating this is another unhappy instance of works of so much importance not having been committed to the care of professional and experienced persons, and proves the necessity of the alteration in such part of the post road laws.

I have valued the expenditure, which now appears in the same distinct portions as they were specified in the original presentments, passed in Spring 1810 and Summer 1811; and the second annexed Table distinguishes in one view the general overseers nominated in such presentments for each portion, the amount of the sums paid by the county treasurer for account of each, the value of the works in their present state, as also the amount required to complete the road, which forms an abstract of the valuation and estimate wherein the object of the inquiry is minutely detailed.

In the first annexed Table, a copy of the general statement furnished by the grand jury to the Government, when application was made by them for the present inquiry, varies materially with that furnished to me by the county treasurer. Their statement alleges that no less than 26,488 *l.* 12*s.* 1½*d.* was granted for this road, as the detail in the Table will show, making an excess beyond the county treasurer's return of 6,221 *l.* 7*s.* 6*d.* or 10,309 *l.* 7*s.* 7½*d.* beyond the original post office estimate; to which sum, if the amount now required to complete the road shall be added, viz. 10,997 *l.* 0*s.* 4*d.*, the excess beyond the original estimate will be 21,306 *l.* 7*s.* 11½*d.* which it is impossible could be fairly required or expended. This great difference between the report of the grand jury and the statement of the county treasurer remains to be examined, which of course will be investigated at the ensuing assizes.

I have the honour to be, Sir, your most obedient servant,

Edward S. Lees, Esq.
Secretary, General Post Office,
&c. &c. &c.

(signed) Charles Coote.

STATEMENT of sums granted for the road between the bounds of county of Limerick and Tralee, as furnished by the grand jury of county of Kerry, to the Government.

	£.	s.	d.
Amount of original post office estimate	16,179	4	6
Further grant for completion	4,200	17	7
Further presentments	4,105	5	—
Private on county	1,515	12	1½
Do on Clannaurice barony	338	—	10½
Do on Truenackeny barony	149	12	—½

Total - £. 26,488 12 1½

Levied of the above by instalments, to repay the advance made by Government } £. 20,875 4 7

Amount not yet accounted for towards the completion of mail coach road from Limerick bounds to Tralee } £. 5,613 7 6½

(signed)

M. Fitzgerald,
Dan Cronin,
John Collis,

The Committee of the Grand Jury, who investigated the overseers accounts.

GENERAL OVERSEERS of each Portion of New Road,

And ABSTRACT of VALUATION and ESTIMATE required to complete the Road.

No.	Denomination of each Portion.	General Overseers.	Sums paid by County Treasurer.	Amount of Value of Expenditure.	Amount of Estimate required to complete the Road.
1.	From the bounds of the county of Limerick to Geale bridge - - -	Thos Wm Sandes, Esq. - -	£. s. d.	£. s. d.	£. s. d.
2.	From Geale bridge to Listowel bridge - - -	The Rt. hon. Maurice Fitzgerald -	12,841 11 3	7,185 11 3	3,056 15 9
3.	From Listowel bridge to Tullycrimeen.	William Ponsonby Esq. -	2,219 8 6	989 1 4	4,201 11 6
4.	From Tullycrimeen to Packapussoon.	James Crosbie, esq. - -	2,175 5 7	881 6 2	2,195 9 11
5.	From Packapussoon to the Barony Brook.	Townsend Gun, Esq. - -	858 5 9	371 19 -	471 7 8
6.	From the Barony Brook to Ballyroe.	George Rowan, Esq. - -	918 - -	304 10 -	470 10 -
7.	From Ballyroe to the town of Tralee.	Robert Hickson, Esq. -	1,154 13 7	370 7 6	601 5 6
Total - - - £.			20,167 4 8	-	-

	£.	s.	d.
Total amount of original Post Office Estimate granted and paid over - - -	16,179	4	6
- - - - Excess over Post Office Estimate granted and paid over - - -	3,775	2	10
- - - - Balance of Presentments granted, yet in Treasurer's hands - - -	212	17	4 ½
- - - - the Valuation of Works executed - - - - -	10,102	15	3
- - - - the Estimate of Works required to complete the Road - - -	10,997	-	4
- - - - Sums advanced and yet unaccounted for - - - - -	5,613	7	6 ½

May 1822.

Charles Coote.

* Note.—The amount of the second Presentment for Nos. 1 and 2, was 4,200 l. and was executed by contract; but not having seen the road previous to the late expenditure, I can only give credit for the value of all the works now remaining, and estimate the amount of what is required to complete them.

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Appendix, No. 3.

A RETURN of all Sums of Money advanced by the Lords Commissioners of the Treasury in aid of the Presentments of the Grand Juries; distinguishing the Counties, the Lines of Road for which the same have been advanced, and the Sums which have been repaid by the Grand Juries.

				ADVANCES BY TREASURY.			AMOUNT REPAID.		
				£.	s.	d.	£.	s.	d.
County ANTRIM:									
Road—	Belfast to Lisburne	-	-	11,147	10	3½	9,679	19	6
-	Lambeg to Belfast	-	-						
-	Hillsborough to Lisburne	-	-						
County CAVAN:									
Road—	Virginia to Enniskillen	-	-	28,537	11	9	28,004	5	6
-	Cavan to Virginia	-	-						
-	Virginia to Lisnaskea	-	-						
County CORK:									
Road—	Ferriby to Middleton	-	-	101,343	4	6	96,306	17	2½
-	Cork to Skibbereen	-	-						
-	Bandon and Bantry	-	-						
-	Cork to Kinsale	-	-						
-	Cork and Youghall	-	-						
-	Tullow to Youghall	-	-						
-	Cork and Bandon	-	-						
City CORK:									
Road to	Liberties of City	-	-	12,835	9	-	4,267	12	7
-	Cork to Bandon	-	-						
County DOWN:									
Road—	Ards to Belfast	-	-	5,618	13	4	2,127	15	3
-	Hillsborough to Lisburne	-	-						
County DUBLIN:									
Road to	Bray	-	-	8,319	17	7	3,605	2	7
-	Howth	-	-						
-	Baltinglass	-	-						
County FERMANAGH:									
Road—	Cavan to Enniskillen	-	-	30,492	19	4	30,492	19	4
County GALWAY:									
Road—	Ballinasloe to Loughrea	-	-	549	-	3½	528	19	6
County KERRY:									
Road to	Tralee	-	-	39,414	11	3	36,114	19	1
-	Tralee to Killarney	-	-						
-	Limerick to Tralee	-	-						
County KILKENNY:									
Road to	Waterford	-	-	8,337	15	11	3,115	16	4
City KILKENNY:									
Road to	Cork	-	-	2,499	15	3	1,436	5	8
-	Killecullen Bridge	-	-						

(continued)

	ADVANCES BY TREASURY.	AMOUNT REPAID.
KING'S COUNTY:	£. s. d.	£. s. d.
Road to Parsonstown and M ^t Mellick - - -	430 7 1	344 5 8
County LIMERICK:		
Road to Tralee - - - - - }	33,303 12 4	33,303 12 4
- to Tarbert - - - - - }		
- between Creanesfort and Glen - - - }		
- to Tipperary - - - - - }		
City LIMERICK:		
Road—Tipperary to Waterford - - - -	4,290 11 10	2,357 3 8
County MEATH:		
Road—Dublin to Slane - - - - -	7,022 1 4½	5,023 14 3½
County MONAGHAN:		
Road to Carrickmacross - - - - - }	13,701 1 6½	9,549 19 9
- to Aughnacloy - - - - - }		
- to Castleblancy - - - - - }		
- to Killowen - - - - - }		
QUEEN'S COUNTY:		
Road—Parsonstown and M ^t Mellick - - -	939 10 1	939 10 1
County ROSCOMMON:		
Road—Carrick to Boyle - - - - -	3,572 13 2	3,572 13 2
County TIPPERARY:		
Road—Tipperary to Limerick - - - - - }	24,736 2 2	22,316 18 3
- Cahir to Tipperary - - - - - }		
- Clonmel to Cahir - - - - - }		
- Cahir and Michelstown - - - - - }		
County TYRONE:		
Road through County - - - - -	22,050 2 4	22,041 14 7½
County WATERFORD:		
Road to Packet harbour at Dunmore - - - }	15,952 7 3	11,964 14 3
- Tullow to Youghall - - - - - }		
County WEXFORD:		
Road to Arklow and Gorey - - - - -	4,000 - -	4,000 - -
County WICKLOW:		
Road to Newtown M ^t Kennedy - - - - - }	60,858 11 8	53,497 19 1
- to Arklow - - - - - }		
- to Waterford - - - - - }		
- to Westernside of County - - - - - }		
- Arklow to Wexford - - - - - }		
- to Boundaries of County - - - - - }		

Note.—The advances made by Government to the respective Counties, were to be repaid by Installments of, at least, one-twelfth each Assize; some of which are not yet due.

Accountant General's Office, }
20th April 1822.

R. Cooper,
Acting Account^t Gen^l.

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Appendix, No. 4.

POST OFFICE.

A RETURN of a Table by which the Rates of Postage are charged in Great Britain.
Scale of Postage:

	<i>d.</i>
For any distance not exceeding 15 miles - - - - -	4
Ditto, above 15 miles and not exceeding 25 miles - - - - -	5
Ditto - 20 miles - - ditto - 30 miles - - - - -	6
Ditto - 30 miles - - ditto - 50 miles - - - - -	7
Ditto - 50 miles - - ditto - 80 miles - - - - -	8
Ditto - 80 miles - - ditto - 120 miles - - - - -	9
Ditto - 120 miles - - ditto - 170 miles - - - - -	10
Ditto - 170 miles - - ditto - 230 miles - - - - -	11
Ditto - 230 miles - - ditto - 300 miles - - - - -	12

and One Penny in addition on each Single Letter for every 100 miles beyond 300.

General Post Office, }
13 April 1822. }

F. Freeling.
Secretary.

Appendix, No. 5.

A RETURN of a Table by which the Rates of Postage are charged in Ireland.

Letters in Ireland are charged Postage according to the following Rates:

	<i>d.</i>
Not exceeding 7 miles - - - - -	2
Above 7 miles, and not exceeding 15 miles - - - - -	3
— 15 miles - - ditto - 25 miles - - - - -	4
— 25 miles - - ditto - 35 miles - - - - -	5
— 35 miles - - ditto - 45 miles - - - - -	6
— 45 miles - - ditto - 55 miles - - - - -	7
— 55 miles - - ditto - 65 miles - - - - -	8
— 65 miles - - ditto - 95 miles - - - - -	9
— 95 miles - - ditto - 120 miles - - - - -	10
— 120 miles - - ditto - 150 miles - - - - -	11
— 150 miles - - ditto - 200 miles - - - - -	12
— 200 miles - - ditto - 250 miles - - - - -	13
— 250 miles - - ditto - 300 miles - - - - -	14

General Post Office, Dublin, }
13 April 1822. }

T. Orde Lees,
Pro Secretary.

Appendix, No. 6.

A RETURN showing the Postage on a Single Letter from London to the following places: viz. Cork, Limerick, Galway, Sligo, Derry and Belfast by Holyhead, and to Belfast by Portpatrick.

	<i>s.</i>	<i>d.</i>
The Postage on a Single Letter from London to Cork, by Holyhead - - - - -	2	2
Ditto - - - - - ditto - - to Limerick - ditto - - - - -	2	-
Ditto - - - - - ditto - - to Galway - ditto - - - - -	2	1
Ditto - - - - - ditto - - to Sligo - ditto - - - - -	2	1
Ditto - - - - - ditto - - to Derry - ditto - - - - -	2	1
Ditto - - - - - ditto - - to Belfast - ditto - - - - -	2	-
Ditto - - - - - ditto - - to Belfast by Portpatrick - - - - -	1	9

General Post Office, Dublin, }
13 April 1822. }

T. Orde Lees,
Pro Secretary.

Appendix, No. 7.

A RETURN, showing the distance in English Miles to the following Places, taking the distance from London to Holyhead to be 264 Miles, and the distance from Holyhead to Howth to be 56 Miles, viz. to Cork, Limerick, Sligo, Derry and Belfast, by Holyhead.

The Distance from London to the following Places in English Miles:

	M.	F.
From London to Cork - - - - -	491	7
Ditto - to Limerick - - - - -	452	3
Ditto - to Sligo - - - - -	464	7
Ditto - to Derry - - - - -	481	7
Ditto - to Belfast - - - - -	433	7

General Post Office, Dublin, }
13 April 1822.

T. Orde Lees,
Pro Secretary.

Appendix, No. 8.

A RETURN of an Order made for stopping the transmission of Letters to England, from the interior of Ireland, by the Sunday Packets; and for stopping the transmission of English Letters, on Sundays, from Dublin to the interior of Ireland.

" They are also of opinion, that on several of the lines it is not necessary to continue the extra charges to which the revenue is made chargeable for conveying the English Mails that arrive here on Sundays; and particularly so, as by the very useful establishment of Steam Packets, the intercourse has become so regular with what it was when the Sunday Mails were first dispatched, that very few instances now occur of the Mails not arriving in time on the evenings of Saturdays to be dispatched by the same night; consequently, it will very seldom occur, that the correspondence of two days would have to be transmitted through the Kingdom on Sundays: the saving will be about 330*l*."

General Post Office, }
22 January 1822. }

(signed) Edw^d S. Lees,
Secretary.

To William Gregory, Esq. &c. &c. &c.

Sir,

General Post Office, 30 April 1822.

Above is the only order which appears upon record to have been issued by the Postmaster General, that has reference to the order of the Committee of the House of Commons upon the Holyhead Road.

I have the honour to be, Sir,

Your most obedient and very humble servant,

General Post Office, }
22d January 1822. }

(signed) T. Orde Lees,
Pro Secretary.

Appendix, No. 9.

A RETURN of what Towns on the Cross Lines of Road in Ireland might receive the Letters from England, if despatched from Dublin on Sundays.

Adair.
Arva.
Askeaton.
Athboy.
Atheary.
Athleague.

Bagnalstown.
Bailyborough.
Ballaghaderin.
Ballybay.
Ballina.
Ballinakill.
Ballinrobe.
Ballyboy.

Ballycastle.
Ballyclare.
Ballyconnell.
Bally James Duff.
Ballymahon.
Ballymoe.
Ballymore.
Ballymote.
Ballinacargy.
Ballinabinch.
Ballinamore.
Ballyragget.
Ballyshannon.
Ballyvary.
Baltinglass.

Banagher.
Bangor.
Bantry.
Bellaghy.
Belturbet.
Blessington.
Brookborough.
Broughshane.
Bruff.
Buncrana.
Burros O'Kane.
Burros O'Leigh.
Bushmills.
Buttevant.

Cabercounlish.
 Caledon.
 Carlingford.
 Carnew.
 Carrickfergus.
 Castle Comer.
 Castle Connell.
 Castle Dawson.
 Castlefin.
 Castle Pollard.
 Castlereagh.
 Castletown Delvin.
 Castlewells.
 Celbridge.
 Charleville.
 Churchill.
 Clane.
 Claree.
 Clare.
 Cloghan.
 Clonagall.
 Clones.
 Clough.
 Cloughjordan.
 Cloyne.
 Colehill.
 Cong.
 Cookstown.
 Cootehill.
 Croome.
 Crossakeale.
 Crossmolina.
 Crossdoney.
 Crumlin.
 Cumber.
 Curofin.

Dervock.
 Dingle.
 Donegall.
 Doueraile.
 Down.
 Dromore, West.
 Drumcree.
 Dungiven.
 Dunmore.
 Dunmore, East.

Edenderry.
 Elphin.
 Ennistimon.
 Eyrecourt.

Farbane.
 Fethard Tip.
 Fintona.
 Five Miletown.
 Florence Court.
 Foxford.

Frenchpark.
 Freshford.

Garvagh.
 Geashell.
 Gilford.
 Glaslough.
 Glenarm.
 Glenavy.
 Goresbridge.
 Gort.
 Graig.
 Granard.

Headford.
 Hollywood.

Innistigue.

Kildorrery.
 Kildysart.
 Kilkeel.
 Killala.
 Killaloe.
 Killinchy.
 Killucan.
 Killyleigh.
 Killynaule.
 Killesandra.
 Kilmallock.
 Kiltrea.
 Kilrush.
 Kingscourt.
 Kinnety.
 Kinsale.
 Knock.
 Knocktopher.

Larne.
 Letterkenny.
 Listowel.
 Loughgall.
 Lurgan.

Maghera.
 Magherafelt.
 Mallow.
 Manorhamilton.
 Miltown Malbay.
 Mohill.
 Moira.
 Moneymore.
 Mount Mellick.
 Mount Nugent.
 Mount Talbot.
 Moville.
 Moynalty.

New Bermingham.
 New Bliss.
 New Castle.

Newport Mayo.
 Newport Tip.
 Newtown Barry.
 Nobbur.

Old Castle.

Pallas Green.
 Parsonstown.
 Passage, West.
 Philipstown.
 Portadown.
 Portaferry.
 Portarlington.
 Portlennone.
 Portlaw.
 Portumna.

Ramelton.
 Raphoe.
 Rathangan.
 Rathdowney.
 Rathfriland.
 Rathkeale.
 Richhill.
 Roscommon.
 Ross.
 Rostrevor.

Saintfield.
 Scrabby.
 Shanagolden.
 Shinrone.
 Six Mile Bridge.
 Slane.
 Stewartstown.
 Strangford.
 Stradone.
 Stranorlar.
 Strokestown.
 Summerhill.

Taghmon.
 Tanderagee.
 Tarbert.
 Templemore.
 Thurles.
 Tinahely.
 Toome.
 Tralee.
 Trim.
 Tubbermore.
 Tulla.
 Tullamore.
 Tullow.
 Tynan.

Warrenspoint.
 Wicklow.

T. Orde Lees,
 Pro Secretary.

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HOLYHEAD ROAD.

REPORT OF MR. THOMAS TELFORD

To the Commissioners for the Improvement of the *Holyhead* Road, dated the
19th of March 1822; upon the State of the Road from

SHREWSBURY BY COVENTRY TO LONDON.

Ordered, by The House of Commons, to be Printed, 2 April 1822.

Report from Inspection made in March 1822.

FROM the eastern boundary of North Wales, at the village of Chirk, or rather at the Ceriog river, to the town of Shrewsbury, the road being under the management of the Holyhead road repair Commissioners, I avoid entering into details more connected with the North Wales districts, which are the subject of a separate Report.

11 *March*.—From Shrewsbury to Emstry the road has been brought into a tolerably good form, the sides cleaned, and the surface partly improved.

Emstry hill has been improved in the cutting and embanking; but the metal has not been properly selected and applied. From Emstry to Atcham the road has been widened, and brought into a tolerably good shape; but the gravel has been put on without screening or proper selection. The best remedy would be to lay a coat of properly broken Overley hill stones for 16 feet in breadth in the middle of the road, and for 6 inches in thickness.

Near Atcham inn, and opposite Lord Berwick's west gate, the road should be raised.

From Atcham to Tern bridge, the road has been much improved as to shape and surface; but some cross drains are still wanting, and also keeping the sides quite dry. From Atcham to the Horse-shoe public house, some parts have been widened, and the general shape improved.

At the Horse-shoe, there is no appearance of improving the direction; it remains, to the disgrace of that part of the road, very much in the shape of the before mentioned sign.

From the said Horse-shoe to the termination of the Trust, the road has been widened in sundry places, by cutting off awkward bends.

The general form of the road under this Trust has been improved, and part of the surface lifted and the stones broken; and when this operation has been extended over the whole Trust, an effectual improvement will have been accomplished.

WELLINGTON TRUST.

From the western extremity of the Trust to the Hay-gate, the road has had its sides cleaned and the general form improved; great part of the surface lifted, and the stones broken, so as to render it smooth.

At the Hay-gate, the road has been widened and improved.

From the Hay-gate to the Cock inn, the road has been partially improved. Its completion may be expected in the course of the present season; and as excellent

metal can be procured from Overley hill and Ercal quarry, there is a prospect of the road being rendered substantially good.

From the Cock inn to near Ketly bank, the road has been considerably improved in form and surface.

Adjacent to Ketly, in consequence of the projected improvement, little has been done; but that being now contracted for, no time will be lost in commencing practical operations.

From Ketly works to the termination of this Trust at the Shropshire canal, the improvement lately executed is in a tolerably fair state, but will require unremitting attention to preserve it so.

SHIFFNAL TRUST.

March 12.—On account of the projected improvement, little has been done between the Shropshire canal and the toll-bar east of Prior's Lee.

From thence to Shiffnal the road is in a tolerably good state, but there is no appearance of great exertion as to improvement. Through the town of Shiffnal the pavement is singularly defective, and requires immediate improvement, unless an entirely new line is adopted on the south side of the town, which is both practicable and advisable.

WOLVERHAMPTON TRUST.

From Shiffnal to Cosford brook, much has already been done in clearing out the sides, bringing the road into a proper shape, and cutting down the hedges; very considerable quantities of good materials are now lying in heaps along the edge of the road, and some broken and put on the road.

There are also some cinder heaps, which may do for the sides.

In sundry places, the forming the sides has produced a considerable quantity of earth and mud; this should be removed.

In ascending the windmill hill, a cross drain is still wanting.

In approaching Cosford brook, some trees on the right render the road damp; they should be lopped and thinned, and some hedges are not yet cut.

From Cosford brook to Whiston cross, the road has had the right-hand side drain mostly cleaned, its form and surface much improved, and great quantities of good materials provided; a considerable portion of which have been very well broken.

The hedges, along this part of the road, have been mostly cut very properly.

From Whiston cross to Summer-house hill, similar observations may be applied; the road being generally in good condition.

Adjacent to the Horns public house, a cross drain is still wanted, this has formerly been repeatedly pointed out; near to the 25-milestone some trees have been very well lopped, but a hedge on the right still requires to be better cut; there are still too many unlopped trees on the left near the Horns.

In consequence of the intended improvement, little has been done west of the Summer-house. On the hill east of Do, the shape has been much improved, and also the road surface for a few feet in the middle, but requires to be extended on each side close up to the fences, the whole width being too small.

From this last mentioned hill to Tattenhall hill, the road has been generally improved, by clearing the sides, and mending its shape and surface; a very considerable portion of good materials is provided.

But on the eastern side of Summer hill, a cross drain is wanted; and at its bottom, besides a cross drain, the hollow should be raised about one yard.

Along Wrottesley park, on account of trees on both sides of the road, the surface is very damp, and in some places broken up; some cross drains are wanted in this district to carry off water, which lies on the upper side, and partly upon the road.

From Wergs village the surface is rough and uneven, and the sides full of water; and hence, all the way to Tattenhall hill, the surface should be lifted, and put into a proper shape; a very considerable quantity of stone is lying on the sides of the road; some hedges still remain to be cut.

At Tattenhall hill the improvement is still in progress. From thence to Wolverhampton, the whole of this road is very rough, on account of having been made

made with too large stones; the whole should be lifted, and brought into a more perfect form; the hedges are not sufficiently cut, and some trees require to be lopped.

13 March.—From Wolverhampton to the termination of this Trust, the road is in general in bad condition; the surface is broken and irregular, the shape is imperfect; there are either unnecessary ditches in the sides, or they are not sufficiently cleaned and defined; the footpaths are too high, and the field roads encroach too much on the public road; cinders are too much substituted for stone (Rowley Rag;) some stone has been provided.

BILSTON TRUST.

The new improvement having been well made, remains generally in good shape, but has been evidently much neglected; the sides are filling up, and the middle wearing down, which if not immediately and carefully attended to, will suffer the road to fall into disrepair, and render it difficult to be restored.

Through the village of Bradley the same observations will apply; and from thence to the termination of the Trust, at Wednesbury, the road is rough and much broken up, the sides have either unnecessary deep ditches, or are not cleaned out; the road is, in fact, fast wearing out.

Through the whole of this Trust there is of late an evident want of attention; and the materials employed are only cinders, which very soon grind to dust or mud; whereas excellent stone is plentiful in the immediate vicinity.

Some of the hedges also require to be cut down.

BIRMINGHAM and WEDNESBURY TRUST.

From Wednesbury to Bromwich hill top, over the flat between the town and the bridge, and on the long steep ascent up the hill, the surface is rough and irregular, and the cross section is imperfect; some very good stone has been provided, and when broken and a proper quantity laid on, and the shape improved, this long and heavy hill will be rendered as perfect as it is capable of.

From Bromwich hill top to the end of the Trust, this road is generally very rough and irregular, in most cases of imperfect shape, and not unfrequently so much broken up, as to be evidently nearly worn out; there is little appearance of any effectual repairs having been lately performed, nor are there any materials provided adequate to the support of a road of such unceasing intercourse. Some hedges require to be cut; many trees overshadow the ground; and there are many heaps of road scrapings which require to be removed.

The management upon this Trust requires immediate investigation, and more vigorous and effectual measures enforced.

BIRMINGHAM TOWN TRUST.

From the termination of the Wednesbury trust at Livery-street, in descending Constitution hill, the form of the road is singularly defective, being deeply concave, and apparently neglected and worn out; it requires to be wholly re-made without delay. Towards the bottom, or flat, the form is much better, but requires attention. The surface of Snow hill is soft and heavy, and should have a coat of hard well-broken pebbles.

Found this street quite obstructed by numerous coal carts, evidently forming a market there.

Over the summit of this hill the pavement has lately been much improved, as also on the eastern descent of the hill from opposite St. Martin's church to near the bridge; and if from the church up the Bull ring to the junction of New-street and High-street, the present rough slippery pavement was taken up, and the ground lowered about a foot on the summit of both streets, the driving-way down the hill widened, and its surface laid flat, and reconstructed, with a good foundation and coat of properly broken stones, the difficulties and dangers now attending this great thoroughfare, would be removed.

BIRMINGHAM

MR. TELFORD'S REPORT TO THE

BIRMINGHAM AND STONE BRIDGE TRUST.

March 14.—After leaving the Oxford road, the top of the small hill should be cut down, and the hollow through which the Warwick canal passes, should be raised about three feet; this would ease the steep bank. This short Trust of nine miles has been much improved; the general shape is good; it has, in many parts, been under-drained, and had the side drains cleaned out; a part of the road has been lifted, the stones properly broken, and the surface reconstructed; in most parts the fences have been cut, and a very considerable quantity of materials has been provided and laid in heaps along the road side, part of which has been broken very properly. But in order to perfect this road, there still remains to be performed, 1st, the remainder of lifting and reconstructing the surface; 2d, near the 4-milestone, one cross drain is wanted, and two more near the 8-milestone; 3d, at Lindon hill, a considerable portion of road is too narrow, and should be made wider, chiefly on the south side, and have some cutting and embanking performed; 4th, some more of the hedges require cutting, also some trees. A county bridge, called Stone Bridge, is much too narrow; its approaches also want raising and metalling.

COVENTRY TRUST.

From Stone bridge to Coventry, the general shape of the road has been much improved, and the sides cleaned out; hard metal has been laid in the middle part of the road, and is gradually extending in width; some parts of the surface still requires to be lifted and improved; and in some few places, the trees and fences still remain uncut.

Through the town of Coventry (which is under District Commissioners) the streets, besides being inconveniently narrow, are crooked and ill paved, although a toll is levied at each end of the town for the purpose of improving them.

From Coventry to Knightlow hill, the same observations will apply as those made on the former part of this Trust.

From Knightlow hill to Dunchurch, much has been done to shape the road and improve the surface; and a considerable quantity of materials is lying in heaps along the side of the road, and part broken. But on account of the formerly very imperfect state of the road, the surface, in the middle, is still thin and weak, and requires still much more material to strengthen it in the middle, and increase its width.

The lofty trees which form a row on each side of this road, especially the Scotch firs, considerably exclude the sun and air; and render the repair of the road much more expensive than it ought to be. As these trees have reached their full prime, it is hoped the proprietors will be induced to fell them; as the object of mere ornament should certainly give way to public convenience.

DUNCHURCH AND OLD STRATFORD TRUST.

From Dunchurch to Daventry.—At Dunchurch, saw a considerable quantity of Nuneaton or Hartshill stone laid down for this part of the road. For some miles from Dunchurch the surface of the road is in a very imperfect state, being soft and much rutted; the sides have lately been, in several parts, cleaned out, and the cross section improved as to form. Near Willoughby, the surface has been considerably improved by Nuneaton stone in the middle, and gravel in the sides, and the side drains have been partly cleared; but the former state of the road having been so imperfect, much more material is required to strengthen it in the middle, and increase the workable part in breadth.

From Braunstone to Daventry the same observations will apply; and there are also very extensive banks of scrapings on the right-hand side of the road.

Adjacent to Daventry some men had begun to lift the road.

Braunstone New Improvement.—At Braunstone a very considerable quantity of Nuneaton stone has been laid down for the new improvement; the embankment between the two canal bridges has been commenced. From the village through the fields, the road has been formed, a rail road has been laid down; and the waggoning, from the deep cutting near the summit, to the aforesaid embankment, commenced. From the summit to the junction with the present road, the new road has been set out, fenced, and partly formed; at its termination a very considerable quantity of bottoming stone has been laid down. At the town of Daventry, both approaches are inconveniently steep and crooked, and the street is narrow and ill paved.

March

March 15.—From Daventry to Towcester, considerable progress has been made towards clearing the sides of the road, and bringing the cross section into a proper shape; on a part of the road near Weedon, where properly broken Nuneaton stones have been laid, the surface is smooth and firm. In other parts, the limestone of the country has been employed with considerable effect; but being more easily ground down it has either been nearly worn out, or cut into ruts. Under the present circumstance it is recommended to pursue the practice of drilling, that is, filling the ruts with the hardest sort of stones broken small, a few at a time, and frequently repeated, until about fifteen feet in the width has been made firm, smooth, and hard, and afterwards to increase the breadth by degrees; but when the sides are, at any time, brought into a proper shape, the same should, without delay, be covered with gravel, or any inferior sort of stones, quite up to the footpath or fence; otherwise the trampling of cattle, &c. will, during the first rainy weather, poach the whole again into an irregular form, which will retain the water.

Upon some parts of this Trust, the hedges have been cut very properly, and will admit the sun and air to dry the road surface, which will prove an incalculable advantage; but in many other instances, along most of this Trust, the hedges yet remain uncut, and almost for the whole length, tall hedge-row trees, on the south-west side, so thick as to be very injurious; so much so, as to leave pools of water standing on the road, which on a surface composed of soft materials contributes, in no small degree, to their hasty decomposition, and entails a very heavy expense upon the toll funds.

The whole of the remainder of this Trust is subject to similar observations.

Cuttle Mill Improvement.—The several operations have been carried on in a very regular and systematic manner, as to cutting, embanking, slopes forming, metalling and binding; the whole is now in such a state of forwardness, as not only to exhibit a complete specimen of road-making, but to insure a speedy completion; the public already enjoy a considerable part of the improvement.

In order to do away with all possible danger upon the high embankment on each side of the bridge, I have, with the concurrence of Sir Henry Parnell, directed a dry stone wall, with a coping set in lime mortar, to be built along each side of the road, instead of posts, rails, and quicksets.

The extension of the improvement up the hill to Plump Park corner, is now proceeding, and, when completed, will perfect the communication across this formerly incommodious and dangerously deep valley.

Stoney Stratford.—The street of this town, remains, as regards pavement, in the dangerously rugged state as formerly described, and has been the cause of some severe accidents.

From Stoney Stratford to Brickhill much pains has, in general, been bestowed, and very considerable progress made in bringing the road into a good shape. The materials, whether gravel, pebble stones, or limestone, have been carefully selected and, as far as practicable, judiciously applied; and the result has been a very sensible improvement of surface; but the formerly very imperfect state of the road has not yet been completely removed, nor a sufficient strength of working surface obtained. Ruts, of course, are not infrequent, and the breadth of metalling requires to be considerably increased. For drilling or filling up the ruts, small broken hard stones are recommended, and the sides may, as formerly pointed out, be made with inferior stones and gravel.

In sundry instances the hedges remain uncut, and tall hedge-row trees and belts, more especially along the S.W. side of the road, as at the 49-milestone, can only be effectually removed by the interference and direction of the proprietors, who, when made fully aware of the expense and inconvenience they entail upon the great lines of intercourse in this industrious country, will, I have no doubt, give immediate instructions to their agents to remove this just cause of complaint.

Brickhill Improvement.—This improvement is in such a state of forwardness as to promise an early completion. Every operation displays the attention and skill of both inspector and contractor, and is at present in a state to exhibit a specimen of the different steps necessary in perfect road-making.

Through the village of Brickhill the sides of the roads are very irregular; the mounds of earth, and other incumbrances between the road and houses, should be removed; a curb-stone and neat small pavement should be substituted, and steps put

to the doors where wanted. If this was done, and the middle properly shaped and covered with a coat of broken pebbles, the whole would correspond with the new improvement, and add much to the beauty of the village.

March 16.—From Brickhill, considerable pains have been bestowed in shaping the road and trying to improve the surface; but the materials hitherto employed are unfit for the middle or working part, which requires hard well-broken pebbles or flint-stones: the materials now used might then be laid along each side. It is unfortunate also, that where such destructable materials are used, that there are extensive belts or plantations along the S.W. side of the road. The cuttings and embankings of the most northern of the Hockliffe hills have been carried on with much energy, and are in a state of great forwardness; a considerable portion of the road has been formed, and the bottom pavement set, with good materials, in a very proper manner. Some top metalling has been dug in the adjacent fields, and some part of it broken.

The cutting and banking between the south hill and the village has been begun.

It is hoped that the Trustees of this road will embrace this opportunity of employing the contractor to raise and improve the road on the south side of the bridge, and extend it to where an improved surface has been left off.

From Hockliffe to Dunstable the road is generally in a very good state, both as to form and surface. It cannot be too strongly urged to employ only well-broken pebbles or hard flints for the middle or workable part of the road, and use the gravel only for the sides. The sides should also be more distinctly defined; and where there is a considerable breadth of waste ground, lower than the road, it should be divided off by a small mound, along the outside of which the scrapings might afterwards be laid until raised to a proper height.

It is desirable that about three or four feet more should be taken from the upper part of Chalk hill, and carried to and laid to raise the surface at the northern extremity of the embankment.

The road over the embankment is generally hard and smooth, and also the lower part of the cutting. Thus far the horses generally trot; but here, if treated as above described, they would trot all the way: as the chalk stands almost at any slope, no inconvenience would arise from slips, &c. From Chalk hill to Dunstable the surface and shapes are good. From Dunstable to the southern extremity of the Trust, near St. Albans, a distance of twelve miles, the road, taken altogether, is in the most perfect condition of any equal distance between Shrewsbury and London: the sides have been generally cleared out and defined; the cross section has been brought into a good shape; the surface made hard and smooth by well-broken flints, and the hedges generally properly cut.

The footpaths still require modelling more perfectly. A very ample provision of flints are laid along the side of the road: it is hoped Mr. Stokes will preserve the favourable character his road has deservedly acquired. Near the southern extremity of the Trust, I was sorry to observe some indifferent gravel laid on the middle of the road. I need only point out the impropriety of this, and suspect it has been done without the surveyor's knowledge.

From the commencement of the St. Albans Trust to the entrance of the town, the road surface is pretty regular and smooth, but is so narrow, crooked, and sunk below the surface of the adjacent fields, as to render it unfit for so great a thoroughfare; its total removal only can remedy such radical effects.

The inconvenience and danger arising from the steepness and narrowness of the street, in the northern part of the town, have been frequently represented as incurable, except by a new line of road.

From St. Albans to Ridge hill considerable pains have been taken in shaping the road; but too much soft gravel is still employed in the middle, instead of hard flints: much of the road is also so narrow, crooked, and either sunk below the level of the adjacent fields, or confined by high mud banks, as to give it more the character of a lane than that of a great thoroughfare. At Ridge hill, instead of hard flints or pebbles, soft gravel has been here too generally employed, and from which a hard and smooth surface is not to be expected. That this desirable surface may be obtained, is evident, from the northern part below the connexion with the old road having been repaired with hard flints, for some time after its first construction, having continued hard and smooth without any great portion of attention.

From Ridge hill to the southern termination of the Trust near Barnet, the road is well shaped and smooth, but the surface is heavy from the nature of the material employed. The gravel, in most of the district between South Mimms and Barnet,

is

is of a superior description from what has been described, but still unfit for the middle of the road. The general direction is more crooked and hilly than in any equal distance between London and Holyhead. Indeed, it must be evident from this account, that most of the Trust requires improvement.

WHETSTONE TRUST.

Between Barnet and Whetstone, a succession of inconvenient hills and hollows also exist, which may be easily remedied.

This Trust has, of late, been much improved in its shape and mode of executing its repairs, with better selected gravel applied with more judgment and economy than formerly; but this gravel is still very improperly used in the middle of the road, which renders it loose and heavy; nothing but hard well broken stones or flints can stand the work of this great thoroughfare; and from the great revenue collected at the tollgates, the public have a right to expect the most perfect road that can be constructed.

ARCHWAY TRUST.

Found the whole of this road in a very imperfect state, the surface irregular, and apparently breaking up in many places; and as few materials are provided for repairs, the future prospect is forbidding. It is hoped the proprietors will exert themselves to maintain this much frequented district of road, which, if suffered to fall into disrepair, will not easily be restored.

From the ISLINGTON Road to KENTISH TOWN, the road is hard and smooth, and in good condition; some materials lie along the road side.

From KENTISH TOWN to the City Road, the road is hard and generally smooth, and is evidence of the perfection to be obtained by using proper material in a judicious manner: this is an instance within the reach of general observation, and is deserving the serious attention of persons interested in promoting the most approved modes of intercourse.

UPON the whole, the state of the road from Shrewsbury to London, shows that the surveyors have made considerable exertions to improve it; and that they have attended to the rules which were drawn up and published for their instruction, by the Parliamentary Commissioners. The use of the road level is gradually bringing the transverse section of the road to the proper shape; and the defining of the road, with proper side drains to 30 feet, gives the whole line a neat uniformity, and makes it appear, that all the work is conducted on a well-adjusted principle. The supplying all the stone-breakers with proper hammers and iron rings of 2 1/4 inches diameter, has nearly accomplished the great object of getting the stones broken to a proper size; and the discontinuing of the use of gravel for the repairs of the 18 middle feet of the road, has been attended with all the good effects which were anticipated. The general attention which the Trustees have paid to the letter of the Parliamentary Commissioners of November 1821, concerning the cutting down of hedges, has been of the greatest service; but the Trustees should not allow so many trees to remain, as noticed in this Report; many of these trees are full grown, and a greater number so crooked or bushy, as not to be of any value, therefore no loss can be sustained by the owners, in cutting them. The Trustees should be aware, that trees add at least 25 per cent to the expense of keeping a road in repair; and therefore, that out of every hundred pounds they spend in repairing a road sheltered with trees, 25 £ goes to repair the injury which is occasioned by the owners of trees not removing them, and should be set down to their account.

THO^S TELFORD.

19 March 1822.

HOLYHEAD ROAD.

REPORT OF MR. THOMAS TELFORD

To the Commissioners for the Improvement of the Holyhead Road, dated the 19th of March 1822; upon the State of the Road from

SIRENSBURY BY COVENTRY TO LONDON.

Ordered, by The House of Commons, to be Printed,
2 April 1822.

170.

HOLYHEAD HARBOUR.

AN ESTIMATE OF THE SUM

Which may be wanted for the present year to defray the Expense of sundry Works
proposed to be done at HOLYHEAD HARBOUR.

Twelve Thousand Pounds,

(£. 12,000.)

Clear of Fees and all other Deductions.

Whitehall Treasury Chambers, }
16th May 1822. }

C. ARBUTHNOT.

Ordered, by The House of Commons, to be Printed
16 May 1822.

- (1.)—Letter from F. Freeling, Esq. to S. R. Lushington, Esq. 16 June 1821 - p. 3.
- (2.)—Letter from Mr. Rennie to the Right honourable The Postmasters General,
June 13th 1821 - - - - - ibid.
- (3.)—Letter from Sir John Thomas Stanley, to George Harrison, Esq. June 25th
1821 - - - - - p. 4.
- (4.)—Copy of Treasury Minute, 29th June 1821 - - - - - p. 5.

—(1.)—

Letter from F. Freeling, Esq. to S. R. Lushington, Esq.

SIR,

General Post Office, 16th June 1821.

I AM commanded by My Lords the Postmasters General to acquaint you, for the information of the Lords Commissioners of His Majesty's Treasury, that their Lordships have received a communication from Sir Henry Parnell, as late chairman of the Select Committee of the House of Commons, appointed in the Session of 1819, to inquire into the State of Holyhead and Howth Harbours, calling their Lordships attention to that part of the Fifth Report of that Committee which relates to the building of a Graving Dock at Holyhead, and of a Breakwater at Ireland's Eye.

Without entering upon the question of the Breakwater, which My Lords conceive to be purely for His Majesty's Government, upon a consideration of the Report of the Committee, they direct me to state that this Department is greatly interested in the formation of a Graving Dock at Holyhead, particularly under the circumstances of the new establishment of steam packets upon that station, which may be considered as liable to greater wear and tear and repairs than vessels acted upon by sails only. In the present state of Holyhead Harbour, the packets when in want of repair must proceed to Liverpool for that purpose, which must be attended with great inconvenience and impediment to the public service, from the delay it must necessarily occasion, which would be obviated by the formation of a dock upon the spot.

Another point in favour of the measure appears to be, that, connected with this Dock, is the erection of a small Pier to protect it, which in blowing weather would afford shelter to small vessels, that would otherwise occupy the proper places for packets in the Pier. This was formerly a great inconvenience, even with the sailing packets, and must be still greater at the present moment that the packets are so much increased in size.

Under these circumstances therefore My Lords conceive it to be their duty to direct me to represent, for the consideration of the Lords of His Majesty's Treasury, that the formation of a Dock at Holyhead, as pointed out in the Report of the Select Committee, would be attended with great advantages to the public service; and to suggest, that a reference may be had to Mr. Rennie the engineer, as to the details and estimates of the expense.

I have the honour to be, Sir, your very obedient humble Servant,

F. Freeling.

P. S. The enclosed Letter has since been received from Mr. Rennie.

S. R. Lushington, esq.

&c. &c. &c.

—(2.)—

Letter from Mr. Rennie to the Right honourable the Postmasters General.

MY LORDS,

London, June 13th 1821.

AGREEABLY to your request I have made a Design of a dry Dock for the repairs of His Majesty's Sailing and Steam Packets at Holyhead, with a Pier from the Turkey Shore, to shelter not only the entrance to this dry Dock, but also to enable the harbour-master to give births to a part of the vessels that frequent this harbour as one of asylum, and thereby to leave the entrance more open, and consequently less dangerous to vessels entering it in storms and contrary winds.

The Pier at Holyhead was originally designed to render the harbour a fit station for His Majesty's Packets, and to enable them to sail to and from it at all times of tide. It has been extended so as to give a depth at low-water spring tides of about 14 feet. The passage to the westward has, likewise, been kept open, by which vessels are not only enabled to avail themselves of an entrance or exit through that passage at half flood, when the wind is not suitable for the eastern passage, but a gentle current is kept up through the harbour, which prevents the settlement of mud or sand in it, and consequently preserves its depth. The result has been, that, instead of its having been preserved for the purpose of His Majesty's Packets, it has become a harbour of asylum for vessels passing up and down the Irish Channel when overtaken by storms or contrary winds; and so beneficial has it been found for that purpose, that no less than 55,000 tons of shipping resorted

resorted to it in the six months ending the middle of April last, exclusive of the packets and the revenue cruisers. From this has arisen an evil not originally foreseen, namely, that of the entrance being so crowded with merchant vessels that scarcely a birth is left alongside of the Pier for the packets, and great danger is occasioned to vessels entering it; this cannot be avoided unless shelter is provided somewhere besides the Pier, from which passengers have to land or embark, and the only place suitable to this purpose (unless the improvements were to be taken up on a large scale,) is by a pier from the Turkey Shore to the Carreg Modlan Rocks, as I have designed, which will not only shelter the entrance to the dry Dock, but will give safe births to some of the ships that would otherwise crowd the entrance.

The cost of this pier, according to my estimate, will be about 19,000 *l.*; and the dry Dock about 9,000 *l.*; together 28,000 *l.*;—but if this scheme is adopted, about 3,000 *l.* of the present funds may be applied in reduction of the above, as the cutting away part of the Carreg Modlan Rocks, and some interior excavation will be saved, so that only 25,000 *l.* will be required from the Public: and as there is a considerable sum of money of the former grants unexpended, if the Lords Commissioners of the Treasury will authorize the application of this money, for the present, to the new proposed works, no further grant from Parliament will be required until next year, as the works, for which the present funds are applicable, may stand over for a year without detriment to the Public.

I have the honour to be, My Lords, your most humble servant,

To the Right Hon. The Postmasters General.

John Rennie.

—(3.)—

Letter from Sir John Thomas Stanley, to George Harrison, Esq.

Reddish's Hotel, Jermyn-street,
June 25th 1821.

SIR,

THE Commissioners of Holyhead Harbour, in their last Reports to the Treasury, suggested that some additions to the works were still wanting to render the Harbour safe and convenient.

It appeared to them, that from the increase of vessels frequenting the Port, and the employment of steam boats, great inconvenience would be felt if means were not afforded for maintaining a clear entrance into the Harbour, and a safe station for the packets aside the Pier, and for the occasional repair of the packets, and other vessels forced to take shelter in a shattered state.

I understand that Mr. Freeling and Mr. Rennie have had a communication with Mr. Vansittart on the subject.

Under these circumstances, I have to request that you would call the attention of their Lordships of the Treasury to the necessity of the Commissioners being informed of their final determination as to their future proceedings.

A small portion only of the sums granted by Parliament for the Improvement of the Harbour remains unexpended, and if nothing more is to be done than what has already been provided for in the estimates, the Commissioners would be obliged in a short time to diminish the number of labourers employed, and prepare for the winding up their accounts.

Should their Lordships be of opinion, however, that the Harbour ought to be further improved, the Commissioners could postpone the completion of such works as are now carrying on, and commence the execution of such as from the change of circumstances have become of more immediate importance; and a grant for the reimbursement of the expense might be applied for next session; but the Commissioners would hope that the sum of about 2,000 *l.* which they have laid out in works not included in the original estimates laid before Parliament, would be paid to them in the course of the present year. Amongst other things they have laid out 800 *l.* for the erection of buildings for the use of the post-office steam boats, and a sum exceeding 1,000 *l.* for the maintenance of the lights in the Harbour.

I have the honour to be, Sir, your most obedient servant,

John Thomas Stanley,

Chairman of the Commissioners
of Holyhead Harbour.

George Harrison, esq.
&c. &c. &c.

— (4.) —

COPY TREASURY MINUTE.

29th June 1821.

READ Representation from the Postmasters General of the 16th instant, stating, that they had received a communication from Sir Henry Parnell (as late Chairman of the Select Committee of the House of Commons, appointed to inquire into the State of Holyhead and Howth Harbours,) calling their attention to that part of the Fifth Report of the Committee which relates to the building of a Graving Dock at Holyhead; and that the post-office Department is greatly interested in the formation of a Graving Dock at Holyhead, particularly under the circumstances of the new establishment of steam packets upon that station, which may be considered as liable to greater wear and tear and repairs than vessels acted upon by sails only; and that, in the present state of Holyhead Harbour the packets when in want of repair must proceed to Liverpool for that purpose, which must be attended with great inconvenience and impediment to the public service, from the delay it must necessarily occasion, which would be obviated by the formation of a Dock upon the spot.

The Postmasters General further state, that another point in favour of the measure appears to be, that, connected with this Dock is the erection of a small Pier to protect it, which in blowing weather would afford shelter to small vessels, which would otherwise occupy the proper places for packets in the pier. Under these circumstances the Postmasters General feel it to be their duty to represent, for the consideration of this Board, that the formation of a Dock at Holyhead, as pointed out in the Report of the Select Committee, would be attended with great advantages to the public service.

My Lords read also a Letter from Mr. Rennie to the Postmasters General, transmitting a design of a Dry Dock for the repairs of His Majesty's sailing and steam packets at Holyhead, with a Pier from the Turkey Shore, to shelter not only the entrance to the Dry Dock, but to enable the harbour-master to give birth to a part of the vessels that frequent this Harbour as one of asylum. Mr. Rennie then proceeds to state, that the cost of this Pier, according to his estimate, will be about 19,000*l.* and of the Dry Dock about 9,000*l.* making together 28,000*l.*; but if this scheme is adopted, about 3,000*l.* of the present funds may be applied in reduction of the above, as the cutting away part of the Carrig Mudlan Rocks, and some exterior excavations, will be saved, so that only 25,000*l.* will be required from the public; and as there is a considerable sum of money of the former grants unexpended, if this Board should authorize the application of this money for the present to the new proposed works, no further grant from Parliament would be required until next year, as the works for which the present funds are applicable may stand over for a year without detriment to the public service.

My Lords read also a letter from Sir John Stanley, the Chairman of the Commissioners of Holyhead Harbour, of the 25th instant, requesting the attention of this Board to the subject of these additions to the works at Holyhead Harbour; and that the Commissioners may be informed of their Lordships final determination, in order that they may govern their future proceedings accordingly, Sir John Stanley states, that a small portion of the sums granted by Parliament for the improvement of the Harbour remains unexpended; and that the Commissioners could postpone the completion of such works as are now carrying on, and commence the execution of such as from the change of circumstances have become of more immediate importance; and that they would hope that the sum of about 2,000*l.* which they have laid out in works not included in the original estimates, would be paid to them in the course of the present year.

My Lords entirely concur in the view which the Postmasters General have taken of the advantage which will arise to the public service from the additional works proposed; but as it is not now practicable to apply to Parliament to make any grant for this service, the Committee of supply being closed, and as there are remaining unexpended of the grants already made by Parliament for the improvement of Holyhead Harbour sufficient funds for enabling the commencement and prosecution of these works until the next session, and as they are so obviously in furtherance of the declared and recorded dispositions of Parliament to render that Harbour as commodious and convenient as possible, in regard to the communications between Great Britain and Ireland, and as it appears that the works for which the said funds in hand were originally designed, may, without any material inconvenience, be postponed to those more immediately important works which are now proposed, My Lords will take upon themselves to authorize the Commissioners for Holyhead Harbour to commence and proceed upon these works according to the Plans and Estimates

framed by Mr. Rennie, in the confidence that the measure will receive the sanction of Parliament in the next session, when My Lords will submit the said Plans and Estimates for the consideration of Parliament, and for the grant of such sum as Parliament may deem fit and proper for this service.

Transmit to Sir John Stanley copy of Mr. Rennie's Letter, and the accompanying Plan, and conveying to him, as Chairman of the Commissioners for Holyhead Harbour, their Lordships approbation of the Plan suggested by Mr. Rennie for the erection of a Graving Dock, and of a small Pier from the Turkey Shore to the Carreg Modlan Rocks; and desiring that the Commissioners will call upon Mr. Rennie for separate and specific detailed estimates of the expense of the said Dock, and also of the said Pier; and in case such estimates shall not in the aggregate exceed the sum of 28,000 *l.* My Lords are pleased to authorize the Commissioners to commence and proceed in the said works, and to apply such monies as may remain unexpended of the grants of Parliament for Holyhead Harbour towards defraying the expense of the said works; and acquaint them that My Lords will, in the next session, submit to Parliament the propriety of making a grant of the sum of 28,000 *l.* and also of such further sum, not exceeding 2,000 *l.* as may be necessary to make good the expense which has been already incurred in the works mentioned in Sir John Stanley's letter.

Acquaint the Postmasters General with the directions My Lords have given.

560.

HOLYHEAD HARBOUR.

AN ESTIMATE of the Sum which may be wanted, for the present year, to defray the Expense of sundry Works proposed to be done at HOLYHEAD HARBOUR:

Also, Papers relating thereto.

Ordered, by The House of Commons, to be Printed.
16 May 1822.

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Shrewsbury and Bangor Ferry ROAD.

ANNUAL REPORT

OF THE

COMMISSIONERS

Appointed under Act 59 Geo. III, c. 30, for the Line of Road from *Shrewsbury*,
in the County of *Salop*, to *Bangor Ferry*, in the County of *Carnarvon*:—

VIZ.

I.

GENERAL STATEMENT of the Income and Expenditure of the *Shrewsbury*
and *Bangor Ferry* Road, for the Year ending 1st February 1822.

II.

REPORT of Mr. W. A. Provis, to the Commissioners, of his Proceedings on the
Road from *Shrewsbury* to *Bangor Ferry*; dated 1st March 1822.

Ordered, by The House of Commons, to be Printed,
25 March 1822.

I.—A GENERAL STATEMENT OF THE INCOME AND EXPEN.

between the 1st of February 1821,

1821.		£.	s.	d.	£.	s.	d.
February 12	TO the Engineer's Account of the Repairs of the Road, from the 15th of January to the 10th of February	306	19	1½			
March 12	To - - Ditto - - from the 12th of February to the 10th of March	302	5	10½			
April 9	To - - Ditto - - from the 12th of March to the 8th of April	270	—	2			
May 7	To - - Ditto - - from the 9th of April to the 5th of May	260	6	6			
June 4	To - - Ditto - - from the 7th of May to the 2d of June	263	19	11½			
July 2	To - - Ditto - - from the 4th of June to the 30th	270	3	10½			
— 30	To - - Ditto - - from the 1st of July to the 28th	287	16	8½			
Aug. 27	To - - Ditto - - from the 30th of July to the 25th of August	290	19	10			
September 28	To - - Ditto - - from the 27th of August to the 26th of September	237	17	10			
October 22	To - - Ditto - - from the 28th of September to the 20th of October	281	17	1½			
November 19	To - - Ditto - - from the 22d of October to the 17th of November	290	2	4			
December 17	To - - Ditto - - from the 19th of November to the 15th of December	351	7	9½			
1822.							
January 14	To - - Ditto - - from the 17th of December to the 12th of January	484	6	10½			
	Expended in Road Repairs, &c.				3,898	4	—
	To the Clerk, a Year's Salary to the 1st of August 1821, £. 160, and Travelling Expenses on Inspections, going to Shrewsbury and back every fourth Week, and Journey to London, &c.				243	4	—
	To the Engineer - - ditto - - ditto £. 160, and d ^o d ^o				242	—	—
	To amount of sundry Bills for printing and advertising £. 26. 16s. 2d. for Rent of Tollhouses, £. 24. 8s. for Stationery and Postage about a year and a half, £. 12. 4s. 4d. and for contingencies £. 13. 2s. 1d.				75	10	7
	To Messrs. Lloyd's Law Bill for drawing Leases of the Tollgates, Stamps and other Law expenses				83	17	3
	To Messrs. Eyre and Strahan for 300 copies of the Act 59 Geo. 3, c. 30				48	15	—
	To one Year's Interest of Debt, and annual Payments for repairs of Branch Roads, to the 1st of August last, as by Treasurer's Account				4,591	10	10
	To Messrs. Beck and Co. for the first Instalment of their Loan, advanced for the discharge of Mr. Smith's Mortgage				917	7	7
					302	3	4
					5,811	1	9
	To Balance in the Treasurer's hands				492	12	7½
	TOTAL				6,303	14	4½

THE above Balance is to be applied towards paying the half year's interest and salaries due the 1st of February, amounting to about £. 627, which leaves a deficiency again this year of about £. 134; this arises from the heavy demands upon the Trust at its commencement, of which, Mr. Smith's debt, amounting to upwards of £. 900, formed a principal part; a portion of which is now paid off on the loan advanced by Messrs. Beck; and also, by an excess in the expenditure in Repairs and Improvements during the last year, beyond the sum applicable for that purpose, which could not be avoided without inconvenience to the Public; but this deficiency will not prevent the due payment of the interest, as there was a month's toll due the 1st of February, which will more than meet it. When these heavy demands are discharged, and the expensive improvements are completed, there will, no doubt, be a surplus, which may be applied to the redemption of the debt.

SHREWSBURY AND BANGOR FERRY ROAD.

3

DITURE OF THE SHREWSBURY AND BANGOR FERRY ROAD,

and the 1st of February 1822;—pursuant to the 59th Geo. III, c. 30, s. 89.

	£.	s.	d.	£.	s.	d.
BY Balance in the Treasurer's hands, 1st February 1821 - - - - -	-	-	-	385	3	3½
By Cash of the Treasurer of the county of Merioneth, in part payment of the allowance for the Repairs of the County Bridges - - - - -	10	-	-			
By Cash of the Trustees of the Conway Road, one year's Allowance - - - - -	50	-	-			
By Cash of the Treasurer of the county of Salop, for repairs of County Bridges - - - - -	10	-	-			
By Geo. Deas's Draft on Mr. Milne, for Money expended on Hendre-issa New Toll House - - - - -	110	-	-			
By Cash received for composition of Statute duty, Fines, &c. - - - - -	26	12	10½			
By Cash of William Jones, on account of Rent for the old Llwyn Tollhouse - - - - -	2	-	-			
By d ^o of Ellis Jones d ^o for the old Hendre-issa d ^o - - - - -	1	1	-			
Casual Receipts - - - - -	-	-	-	212	13	10½
By Amount of Rents received of the Tolltakers and others, between February 1, 1821, and February 1, 1822, as under; viz.						
Lonissa Gate - Richard Jones - - - - - 1st Letting 69 18 10				286	12	2
Ditto - Messrs. Jones and Clarke - - - - - 2d d ^o - 166 13 4						
Tyn-y-lon Gate - Lewis Hughes - - - - - 1st d ^o - 60 6 6				216	6	6
Ditto - Messrs. Jones and Clarke - - - - - 2d d ^o - 156 - - -						
Bettws Gate - Mrs. Jones - - - - - 1st d ^o - 29 16 2½				260	16	9
Ditto - Collected - - - - - 2d d ^o - 251 - - 6½						
Hendre-issa Gate - John Rusbrook - - - - - 1st d ^o - 59 2 6				202	9	2
Ditto - Richard Williams - - - - - 2d d ^o - 143 6 8						
Cernioge Gate - Robert Thomas - - - - - 1st d ^o - 78 13 4				298	13	4
Ditto - John Ellis - - - - - 2d d ^o - 220 - - -						
Druid Gate - Robert Thomas - - - - - 1st d ^o - 102 13 4				302	13	4
Ditto - Robert Jones - - - - - 2d d ^o - 200 - - -						
Corwen Gates - John Jones - - - - - 1st d ^o - 134 4 7				543	7	9½
Ditto - Collected - - - - - 2d d ^o - 409 3 2½						
Llangollen Gate - Mr. Whitehurst - - - - - 1st d ^o - 50 13 4				158	13	4
Ditto - Ditto - - - - - 2d d ^o - 108 - - -						
Whitehurst Gate - Ditto - - - - - 1st d ^o - 115 13 4				322	6	8
Ditto - Ditto - - - - - 2d d ^o - 206 13 4						
Llwyn Gate - Evan Jones - - - - - 1st d ^o - 75 9 9½				238	16	-
Ditto - Collected - - - - - 2d d ^o - 163 6 2½						
Queen's Head Gate - John Jones - - - - - 1st d ^o - 144 9 2				411	2	6
Ditto - Ditto - - - - - 2d d ^o - 266 13 4						
Shrewsbury Gates - Mr. Palmer - - - - - 1st d ^o - 178 4 4				514	17	8
Ditto - John Gossington - - - - - 2d d ^o - 336 13 4						
By Cash of the Proprietors of the Regent Coach, for Tolls from the 1st of February 1821 to the 1st of February 1822 - - - - -				982	16	-
By ditto - ditto of the Prince of Wales Coach ditto ditto - - - - -				982	16	-
By ditto - ditto of the Chester Coach ditto ditto - - - - -				34	8	-
Produce of the Gates - - - - -				5,706	15	2½
TOTAL - - - - -				6,308	14	4½

N. B.—The 1st Lettings consist of four months Rents, and the 2d Lettings of eight months Rents.

THIS Account has been made up from the Engineer's monthly certificates of the money expended in the Repairs of the Road; also, from Accounts balanced monthly, of all Receipts and Payments passing through my hands; and from the Treasurer's Accounts, pursuant to an order of the Commissioners.

March 1, 1822.

J. WYATT,
Clerk to the Commissioners.

Gentlemen,

THE amount of the new additional Tolls now levied on the Road from Shrewsbury to Bangor Ferry, having been very much exaggerated and misrepresented, I have thought it not an improper accompaniment to my annual Account, to insert the following Comparative Statement of the Old Tolls, with those now charged, by which it will be seen that the whole advance between Shrewsbury and Bangor Ferry, does not amount to more than 12s. on posting with a pair of horses, and on Sundays only 6s. 2d.; and 8s. 7½d. for a stage coach. The necessity of levying such increased tolls is sufficiently apparent, from the annexed statement of the income and expenditure of the Road.

To show also that the travelling is very little affected by the increased tolls, I have also added a Comparative Statement of the Travelling (through one of the gates, kept in hand by the Commissioners) in the corresponding half years of 1819, 1820, and 1821; and also in the years ending August 1, 1820, and August 1, 1821, being from the commencement of the new Trust to the 1st of August last. By this statement it will be seen, that the travelling in gentlemen's carriages has progressively increased; that in the post chaises has certainly diminished, with the exception of some improvement in the half year ending 1st August last; but this arises chiefly from the improved regulations in the stage coaches, and the reduction of the fares, making it cheaper and more expeditious to travel by the coaches. There appears too a small falling off in the number of gigs, in the half year ending 1st February 1821; but this is more than amply made up by the great increase in the last half year.

There has been a considerable fluctuation in the number of saddle and cart horses, and a great falling off in the latter; but this may be accounted for in the depressed circumstances of the farmers.

I have the honour to be

Your faithful and obedient servant,

March 1, 1822.

J. Wyatt.

To the Commissioners of the
Shrewsbury and Bangor Ferry Road.

COMPARATIVE STATEMENT of the Old and New Tolls for a Pair of Horses to a Carriage, on the Road from Shrewsbury to Bangor Ferry.

	No. of Miles.	Old Tolls.			New Tolls.		
		£.	s.	d.	£.	s.	d.
Shrewsbury to 10 Mile Stone - - - One Gate - -	10	-	-	8	-	-	8
10 Mile Stone to Oswestry - - - One Gate - -	8	-	-	8	-	1	-
N.B.—The Oswestry Act allowed 1s. a Pair - -	-	-	-	-	-	-	-
Oswestry to Llangollen - - - Three Gates - -	12	-	1	4	-	1	4
Llangollen to Corwen - - - One Gate - -	10	-	-	8	-	2	6
Corwen to Cernioge - - - Two Gates - -	13	-	1	4	-	5	-
Cernioge to Bangor Ferry - - - Three Gates - -	12	-	5	-	-	11	-
		-	0	6	1	1	6
Deduct old Tolls - - - - -		-	-	-	-	0	6
Additional Tolls for 8½ Miles - - - - -		-	-	-	-	12	-
Deduct amount of double Tolls that used to be taken on Sundays - - - - -		-	-	-	-	5	10
Leaves additional Tolls on Sundays, only - - - - -		-	-	-	-	6	2

The additional Tolls on a Stage Coach (allowing for the double Tolls which used to be taken on Sundays,) amount only to 8s. 7½d. per day, each time of passing between Shrewsbury and Bangor Ferry, a distance of 8½ Miles.

The additional Tolls on Cart Horses, altogether amount to 8d. a Horse, between Bangor and Cernioge Inn, and 6d. a Horse between Cernioge and Llangollen. The Tolls continue to be taken at the same number of Gates as formerly.

COMPARATIVE STATEMENT of the TRAVELLING through Bettws Gate, from the commencement of the New Trust (viz. August 1st, 1819) to the 1st February, 1822.

DESCRIPTION OF TRAVELLING.	The ½ Year ending February 1, 1820.		The ½ Year ending February 1, 1821.		The ½ Year ending February 1, 1822.		The Year ending August 1, 1820.		The Year ending August 1, 1821.	
	Nº of each.	Nº of Horses.	Nº of each.	Nº of Horses.	Nº of each.	Nº of Horses.	Nº of each.	Nº of Horses.	Nº of each.	Nº of Horses.
Carriages and Four - - - - -	109	436	112	448	151	604	236	944	197	788
Dº and Pair - - - - -	203	526	327	654	374	748	542	1,084	604	1,208
Chaises and Four - - - - -	9	36	-	-	2	28	10	40	1	4
Dº and Pair - - - - -	301	602	209	418	237	474	539	1,078	385	770
TOTALS - - - - -	682	1,600	648	1,520	769	1,854	1,327	3,146	1,187	2,770
Gigs and Pair - - - - -	23	50	44	48	10	38	45	90	43	26
Dº and Horse - - - - -	147	147	135	135	205	205	299	299	201	201
TOTALS - - - - -	172	197	159	183	224	243	344	389	304	347
Saddle Horses - - - - -	1,855	-	836	-	1,395	-	2,945	-	1,897	-
Cart Horses - - - - -	711	-	658	-	385	-	1,318	-	1,040	-
Cattle - - - - -	3,096	-	3,530	-	3,603	-	4,184	-	5,096	-
Sheep and Pigs - - - - -	2,132	-	2,835	-	1,997	-	4,425	-	4,385	-
TOTALS - - - - -	7,794	-	7,859	-	7,382	-	12,872	-	12,268	-

II.

REPORT of Mr. *W. A. Provis*, to the Commissioners, of his Proceedings on the Road from *Shrewsbury* to *Bangor Ferry*; dated 1 March 1822.

To the Parliamentary Commissioners for improving and maintaining the Road from Bangor Ferry to Shrewsbury.

GENTLEMEN,

A GREEABLY to your general instructions, I have now to lay before you a statement of my proceedings in regard to the repair and maintenance of the Road between Bangor Ferry and Shrewsbury; in doing which, I shall follow the arrangement hitherto acted upon, and commence my observations at Bangor Ferry.

BANGOR FERRY TO CERNIOGE,—31 $\frac{1}{2}$ Miles.

The New Road from Bangor Ferry to the city, is now in good order, and having become well consolidated, it may be kept in the same state with a moderate share of attention.

The small portion of old Road (about a quarter of a mile) at the S.W. end of Bangor, remains in the same state as when I last reported to you. It is in fair order as far as regards smoothness and hardness of surface; but it is too narrow, and there being houses along the greater part of each side, and those of one side being built on a much lower level than those on the other, the Road forms a steep incline in its transverse section, which cannot be effectually cured but at a considerable expense. I have, however, in my Estimate for next year's work, provided for improving it in such a manner as to remove much of the present inconvenience.

At the east end of Bangor, the improvements proposed in my last Report, have been completed; indeed more has been done than was at that time contemplated; for Mr. Pennant having proffered to give the land for widening a narrow part near the tollgate, I took the benefit of his liberality, and increased the breadth as much as was necessary for a good Roadway, and a Footpath on each side. The whole, therefore, is now finished, from the market-place in Bangor to the new Road near the Penrhyn Arms, being a distance of 960 yards.

From the termination of the new Road, S. E. of Llandegai, to that commencing at Lon-issa, being a distance of 982 yards, the surface remains as before, sound and hard; its extreme narrowness however renders it not only inconvenient but dangerous.

The new Road stated in my last Report, as commencing at Lon-issa, and proceeding about three miles up the valley of the river Ogwen, to nearly opposite the great slate quarries, has been extended during the last year, by the Commissioners under the 55th Geo. III, to within a quarter of a mile of Tyn-maes; thus effectually curing all the hills and bends of the old Road. It has been a little heavy during the late wet weather, but not more so than any other new Road the first winter it is travelled upon.

From this new piece to that commencing a mile S. E. of Tyn-maes, the greater part of the old Road has been stocked up, the stones broken, and laid down again, and the surface brought to a proper shape and solidity. The remaining distance is hard and rough, but in the course of the ensuing summer, will be brought to an equally good surface with the first mentioned portion. New fences, however, will then be required, to make it correspond with the Road at each end. The rock at Ty-gwyn has been sufficiently cut away.

The new Road from a mile east of Tyn-maes to Lake Ogwen sustained some little injury to its surface, during the late wet weather, in consequence of a torrent bringing down a large mass of stones and rubbish from the mountain, which completely buried a part of the Road, and turned a considerable stream of water along it.

This

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SHREWSBURY AND BANGOR FERRY ROAD.

This was, however, immediately attended to, and it is again in a proper state. From lake Ogwen to Capel Cerig the new Road is in excellent condition.

From Capel Cerig to the next piece of new Road, about a mile to the south east, the surface is in very good order; the low sides have been raised, and some additional cross drains constructed. A new breast wall and parapet are much wanted where the Road is confined between the rocks and the river Llugwy.

The new Road down the valley of the Llugwy to about three-quarters of a mile west of Bettws-y-coed, is in perfect order.

The old Road from thence to within 200 yards of the village, is in a very good state, with the exception of the hollow opposite Hendre-rhys-Gethen. This hollow should be raised, and the bend cut off.

The improvement at Bettws-y-coed, which I last year mentioned as having been commenced by the Commissioners under the 55th Geo. III. has been completed, and is, as well as the rest of the new Road from Bettws to Rhyddlanfair, in excellent order.

From Rhyddlanfair to Glan Conway, the old Road, though narrow, is in very fair order. The parts at the county Bridges, stated in my last Report, as out of order, have been improved, in consequence of the magistrates of that district allowing me to contract for repairing them at the expense of the county. The money being paid by the magistrates to the man who performs the work, is the reason why it does not appear in the Commissioners accounts.

The new Road from Glan Conway to Pont-y-padoc, is as good as it can be; and from thence to Hendre-issa only requires a little more time to consolidate and harden. This latter portion had been made and opened to the public, when I made out my last Report; and since that time the whole of the new line through Pentre Voclas to near Cernioge-mawr, has been opened and travelled upon. When it has had another year's wear, it will not be inferior to any of the improvements on the Holyhead Road.

The new tollhouse at Hendre-issa was completed in time for the opening of the Road.

As the Road from the termination of the last mentioned improvement, to Cernioge inn, was very irregular in its breadth, and badly fenced; new walls have been built, and the metalling made good, so as to correspond with the work of the new Road.

CERNIOGE TO CHIRK,—30 Miles.

The old tollgate and posts at Cernioge having been completely worn out, I was under the necessity of getting a new set put up. These make the tollhouse look excessively shabby; but as the gate and turnstile are of iron, and the posts and rails of sound oak, they will do very well to remove when a new tollhouse shall be built.

From the tollgate, a distance of 789 yards, the surface has been brought into good order. Its breadth however is irregular, and it wants a retaining wall on the upper side.

The next two thirds of a mile is very hilly and imperfect, but a new Road being now on hand under the Commissioners, these inconveniences will soon be removed.

From the eastern termination of this new Road to that near Cerig-y-druidion considerable improvements have been effected during the last year, by the Commissioners under the 55th Geo. III. The steep pitches at Clwstyblaidd, and those near Cerig-y-druidion, have, by cutting and embanking, been brought to proper rates of inclination. As they have also been completely metalled and fenced, what were till lately the most objectionable portions of the Road, are now the best. The parts between the new pieces have been brought into a pretty good surface, by the repair Commissioners. New stone fences were however much wanted, and are now on hand, as the droves of pigs which are so often passing, are continually tearing down the turf mounds and spoiling the side drains. The Road is in some places below the level of the bog, and consequently flooded after heavy rains: to remedy this, a full coat of metalling should be put on, which would raise it above the morass; and some more cross drains should be built: these are on hand.

A short piece of new Road S. E. of Cerig-y-druidion has also been made during the last summer, by the Commissioners under the 55th Geo. III.

Across the bog, S. E. of Cerig-y-druidion, the low sides have all been raised, and the Road has had a coating of broken stones, by which means it has been brought into pretty good order. The turf fences on each side should be replaced by stone walls,

walls, as they are liable to the same objections as those to the N. Westward of Cerig-y-druidion.

The next half mile remains in nearly the same state as when I last reported; the surface being tolerably good; but some low sides want raising; a hill requires to be cut down, and protecting fences should be built along the river side.

The 234 yards up to the new Road at Hendre-v-ddwyfaen being along low ground, and subject to be flooded, I have had embanked about two feet in height, and new metalled; this has also helped to ease the descent at its N. W. extremity.

The new Road between the two Bridges over the Gairw is in good repair.

Between the last mentioned new Road and Glyn Dyffws nothing but surface improvement has been done this year. It is now tolerably smooth.

The new Road from Glyn Dyffws to about a mile N. W. of the Druid Inn, is in the same perfect state as the rest of the new Road made under the 55th Geo. III.

From this new Road past the Druid Inn and across the Alwen and Dee Bridges, the surface is now in a respectable state. The low sides N. W. of the Druid Inn have all been raised; they however still require raising to the S. E. of the Druid.

The cutting down and protecting the hill half a mile N. W. of the Druid, building retaining walls, and the general improvement between the Alwen and Dee Bridges, are still necessary works upon this division.

During the heavy flood on the 2nd February, the Bridge over the river Dee near Corwen gave way, and one half of three arches fell down. The Bridge was originally very narrow; and in order to make it more commodious, the county got another narrow Bridge built close to it, and tied them together at the level of the Roadway. The new part had not been properly founded; and a separation took place between the new and old work, which had been gradually getting worse, till the late flood brought down three of the new arches, and seriously damaged the remainder. I fear the county will be obliged to build an entire new Bridge.

Between Corwen Bridge and Town, the Road, with the exception of about 500 yards, has been widened, properly formed, metalled, and fenced; and is now a complete new Road.

Through Corwen and for 1,100 yards east of the tollgate, the Road surface is sound and smooth. It is however much too narrow from the tollgate eastward.

The next 636 yards has, during the last two summers, been widened, the hills reduced to proper inclinations, and the whole new metalled and fenced complete.

As this part, previous to its improvement, was very dangerous from there being no protection whatever between it and the river Dee, and the direction of one place leading directly into the river; I trust that the expense that has been incurred will be considered as well bestowed.

From this improvement to the new Road at Owen Glandwr's Hill nothing has yet been done but maintaining its surface firm and good, and building some additional cross drains.

From the east end of the new Road at Owen Glandwr's Hill to that west of Rhysgog Hill, a completely new piece of three miles in length has been made during the last summer, by the Commissioners under the 55th Geo. III. This has been open to the public some months, and has avoided a very hilly, narrow and unsound part of the Road.

A new tollhouse has also been built by the same Commissioners, with wrought iron gates, &c. complete; in lieu of the old house which was abandoned along with the old Road. A weighing engine has also been put down.

The new Road over Rhysgog Hill remains in its usual perfect state.

From the eastern end of the new Road just mentioned, to the Town of Llangollen, the surface of the old Road is in a good sound state, excepting at the Hill about a mile west of the Town, which being much too steep, should be either improved or avoided. A protecting parapet has been built where the river Dee and the Road run close to each other.

At the Town of Llangollen a variation has been made by the Commissioners under the 55th Geo. III, at the back of the church, in order to avoid the narrow and crooked streets. This has been opened some months, and is now firm and good.

From Llangollen, to a little west of Biddulphs lime kilns, the sides have been raised, and the Road brought to a proper section. The greater part also has been coated with well-broken limestone; and the whole surface is in good order. Retaining and fence walls are still required in sundry places, and something should be done to ease the ascent immediately east of Llangollen.

From

From near the limekilns, to the termination of the district at Chirk Bridge, an entire new Road is now making by the Commissioners under the 55th Geo. III. This will be opened in the early part of the summer, and besides shortening the distance near half a mile, will avoid all the steep hills and dangerous turns, which made the old line so very objectionable. Nothing, therefore, is now doing on the old Road, but such occasional repairs and patching as are necessary to keep it in travelling condition.

Whitehurst's tollgate being avoided by this new Road, it will be necessary to construct a new house and gates; but as the most suitable situation can best be determined after the direction of the travelling has been changed and carefully noticed, I think it will be most advisable to remove one of the old gates from Whitehurst's, and fix it up and collect the tolls at the Black Park railway, about half a mile N. W. of Chirk. The Commissioners have now a small cottage there used for collecting tolls upon coals from Black Park; and which, at a small expense, may be made to answer both purposes.

CHIRK TO SHREWSBURY,—23 Miles.

From Chirk to Oswestry, the surface of the Road has been maintained in fair order; and by gradually putting on more materials than are destroyed by the wear and tear, it is becoming more solid and substantial. A considerable extent of sides has been cleared from the accumulated dirt, and brought to a proper shape; and in the course of the next summer I think the whole will be cleared off. A little south of Gobowen, a small bridge of three culverts has been lengthened, a good stone parapet built on each side, and the roadway raised so as to make good the approaches.

From Oswestry to the Queen's Head, the Road has been maintained in good order, and nearly all the requisite cross drains have been constructed. Near the Queen's Head tollgate, a short length of retaining wall has been built, in order to keep up the steep sandy bank.

From the Queen's Head to Nesscliff, a good many new cross drains have been built; and the low sides, with the exception of some near the Wolf's Head, have been properly raised. At the Wall Brook, new stone parapets have been built upon the bridge, in lieu of the old rotten railing, and the Road thereby made quite safe.

The surface of this part is in good order; but it is in many places too narrow, particularly at Nesscliff. I hope to get some of those places widened during the summer.

From Nesscliff to the Road leading to Great Ness, the surface is good; but the lower side in some places requires raising, and the greater part should be widened. Mr. Edwards of Ness has consented to cut down the fine trees on the south-west side of the Road, and to let us have land for widening.

At the turn to Great Ness, the widening of the Road and cutting down the rocky hill, which were included in my last year's estimate, are now on hand. The rubbish from this cutting is used principally in filling up the deep ditches to the south-east; and what good stones can be procured, are kept for retaining walls and drains.

From hence to Montford Bridge, the drainage has been rendered tolerably perfect, by the construction of cross drains. The greater part of the ditches and low sides have been filled up, and the rest are in progress.

From Montford Bridge, over the hill to near Bicton-Lane, little has been done besides keeping the surface in order. From the latter place to near Shelton, the whole of the ditches and low sides have been properly raised; and when some parts of the surface have been stocked up, and the stones broken, this length will be very good.

At Shelton, a considerable quantity of the high bank of Road scrapings have been carted away for raising the sides just mentioned. The natural ground, however, in several places is so high and steep above the Road, that it can never be made good till they are sloped back so as to give access to the sun and air.

Between Shelton and Shrewsbury, a considerable improvement is on hand, and nearly finished, at the Monk Eye Prill. The old Road made a quick descent in each direction to the stream, so that loaded waggons and carts were obliged to drag down; the banks on each side of the Road were high and perpendicular, and the breadth insufficient.

The consequence was, that the surface was continually torn to pieces, and constantly

stantly out of order. As I found that any attempt to repair it would be expense thrown away, I have had a new culvert built, the hollow embanked 10 feet in depth, the breadth increased to 34 feet, including the footpath, the high banks sloped back, and new fences put down. When the metalling is done, the whole will form a quarter of a mile of complete new Road.

The rest of the Road between Shelton and Shrewsbury is partly in pretty good repair, and partly but indifferent, from its being so much shaded by the high banks, and being too narrow. These objections however are likely to be removed soon, and the whole brought into a good state.

HAVING now laid before you a general statement of what has been done during the last year, for the improvement and maintenance of the Road, I shall proceed to the Account of Expenditure; distinguishing as before, what has been applied to its Ordinary Repair, and what to New Works.

EXPENDITURE

From January 15th, 1821, to January 12th, 1822.

Ordinary repairs:	£.	s.	d.	£.	s.	d.
Three inspectors wages for 13 months	221	8	—			
D ^o - - incidental expenses	10	19	9			
Labour by day	803	18	10½			
Breaking stones by task	570	11	6½			
Purchase of stones from flannors, &c.	21	19	11			
D ^o - - delivered in the road	43	11	9½			
Quarrying stones	6	13	5½			
Gathering field stones by women and children, &c.	31	12	—			
Getting gravel	50	10	2			
Loading d ^o and stones into carts	18	19	8½			
Carting stones and gravel	92	8	6			
Opening gravel pits, and levelling old ones	27	10	2			
Fencing d ^o	3	9	8			
Gunpowder for blasting stones	3	2	10½			
Rents of quarries and gravel pits, and damages thereat; and rent of tollhouse	26	15	8½			
Scraping dirt off the Road	168	4	—			
Loading d ^o into carts, and casting some over the hedges into the fields	72	13	1			
Repairing bridge railing at Gobowen	—	11	2			
D ^o - - a cross drain	—	1	6			
Whitewashing tollhouses, painting gates, repairs at houses and gates, oil for lamps, &c.	21	1	6½			
Tools, utensils, and repairs thereof	64	19	9½			
Charges for adjusting composition for statute duty in the hundred of Oswestry	2	12	—			
				2,263	15	2½
New work:						
Widening Road, building breast and fence walls, and cross drains, forming footpath, putting down curb stones, me- talling Road, altering and refixing tollgate, making a new approach to the dispensary, in consequence of the old one being destroyed in lowering the Road, &c. &c. at the east end of Bangor	194	1	9			
Stocking up Road, breaking the stones, and putting them down again between Tyn-maes and Ty-Gwyn	19	4	3			
Stocking out and breaking large stones in sundry other places	17	4	3			
Cutting down rock, widening and metalling the Road at Ty-Gwyn, 2 miles N.W. of lake Ogwen	41	16	—			
Embanking and metalling hollow, ¼ S.E. of Capel Cerig	25	—	—			
Building new fence walls at Cernioge	16	11	6			
New wrought iron tollgate and turnstile, new oak posts and rails, carriage and fixing at Cernioge; 2 new timber gates at Corwen; fencing Llwyn tollhouse garden, lamps, and sundry alterations	43	4	11			
On account of Hendre-issa tollhouse (afterwards repaid by Commissioners under the 55 Geo. III.)	10	—	—			
Raising Road sides in Bog, S.E. of Cerig-y-druidion	15	2	3			
Embanking and metalling Road at Hendre-v-ddwyfaen	44	7	9			
Carried forward				£.	2,263	15 - 2½

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	£.	s.	d.	£.	s.	d.
Brought forward -	-	-	-	2263	15	2½
Widening Road, cutting down banks, building breast and fence walls, and metalling between Corwen Bridge and Corwen -	130	8	9½			
Removing a weighing engine pit at Corwen away from the Road -	1	18	—			
Paid for a shed, destroyed for widening the Road at the east end of Corwen -	3	—	—			
Walls built ½ of a mile east of Corwen -	2	1	—			
Widening Road, lowering banks, cutting away rock, building retaining and fence walls, metalling, &c. at the Common, a little west of Plas Bonwm (or 1 mile east of Corwen) -	192	16	3½			
Building parapet along the river side, 1 mile west of Llangollen -	20	4	—			
Lengthening and building parapets to Pentre-wern Bridge, (near Gobowen) and building parapets to Wall Brook Bridge (1 mile S.E. of Felton) -	29	12	11			
Paving side drains at Oswestry, on account -	1	—	—			
Building retaining wall near Queen's Head -	8	17	—			
Widening and cutting down hill near Great Ness, on account -	42	10	—			
Raising Road sides between Montford Hill and a little N.W. of Shelton -	252	6	—			
Do - - in sundry other places, but principally between Llangollen and Pontcysyllte -	145	—	8½			
Lowering Road sides in sundry places -	6	3	7			
Widening Road, cutting down a bank, raising the hollow, fencing and metalling the Road, &c. at the Monk Eye Prill, between Shelton and Shrewsbury; in part -	247	1	10			
Fencing gravel pit and Road near Shelton -	7	18	10			
Oven for Shelton tollhouse -	3	18	8			
Lowering footpath near Shelton -	—	15	6			
Recesses for holding stones in sundry places -	16	1	—			
Cross drains in sundry places -	87	2	—			
				1,634	8	9½
				£. 3,898	4	—

The foregoing Account, when compared with that of last year, shews a reduction in the expense of Ordinary Repairs, of about £. 200. This has arisen partly from the new pieces of Road made by the Commissioners under the 55th Geo. III. having been retained in their hands, and partly from the generally improved state of the old Road. Had the last winter been equally favourable with the previous one, the difference of expense in maintaining it would have been still greater. It will be further observed, that the labour by *day* has been reduced about £. 218, and now forms only about one-fifth of the total expenditure.

The scraping the dirt off the Road amounts to a considerable sum, which is chiefly owing to the prevalence of wet weather during the last year.

The expense of stone and gravel laid on the Road, is less than the preceding year; but I expect an increase on that account during the current year, in consequence of the Road having been worn too thin in many places, by repeatedly scraping off the dirt, and the weather having been too wet to allow us to put on fresh materials with advantage.

THE following is an Abstract of the Work that has been performed upon the several divisions of the Road, from the 15th January 1821, to the 12th January 1822:—

Average number of men employed -	-	-	-	89.
Stones quarried or gathered, and broke -	3,238½	cube yards	} 6,710	loads.
Ditto -	2,661½	loads		
Broken stones laid upon the road -	2,121	cube yards	} 5,425	loads.
Ditto -	2,774½	loads		
Gravel provided at the pits -	1,840½	cube yards	} 2,838	loads.
Ditto -	538	loads		
Gravel cleaned, broke, and laid upon the road -	263	cube yards	} 1,949	loads.
Ditto -	1,620	loads		

Length of ditches filled up, and sides raised at sundry places	8,520	
D ^s - - new retaining fence and parapet walls	2,259	
D ^s - - breastwalls built	260	
D ^s - - road completely formed, bottomed, metalled, &c. exclusive of that between Shelton and Shrewsbury	848	
D ^s - - old road stocked up, stones broke, and laid down again between Tyn-maes and Ty-Gwyn	538	yards.
D ^s - - large stones stocked out of road and broken	1,770	
D ^s - - curb stones put down at sides of road at Bangor	842	
D ^s - - watercourses opened and cleansed	1,680	
D ^s - - dirt scraped off the surface	201,744	
Dirt filled into carts by Commissioners' men, and taken away by farmers	10,478	loads.
Points of rock cut away in various places	318	cube yards.
Number of recesses for holding stones made	19	
New cross drains	30	
Old d ^s - - - - - lengthened	7	
Length of road cut down and embanked, and partly fenced and metalled, between Shelton and Shrewsbury	440	yards.
New tollgates put up	3	
Old tollhouses whitewashed and repaired	10	
Sets of tollgates and posts painted	16	

In the above, the stone and gravel are stated partly in cube yards and partly in loads, which I have afterwards reduced to loads only, in order to simplify the totals. I have supposed each cube yard to contain a load and quarter, which I consider about the average. It would be preferable if all could be measured by the definite quantity of cube yards; but as the greater part of the stones used in the Shropshire district, and some in Wales, are gathered by the hand from the surface of the fields; and these being filled into carts, and carried where they are to be used, and deposited in small heaps, there are no means of keeping an account otherwise than by the number of loads, without incurring the increased expense of stacking them in large regular heaps, and afterwards removing them to where they are wanted. One of the foremen, however, is at all times at hand, to see that there is no unfair work.

The difference between the quantity of stones and gravel provided, and the quantity laid upon the Road, shows that we have a considerable stock on hand, ready to be used when required.

HAVING now stated what has been done during the last year, towards the progressive improvement and maintenance of the Road, I shall proceed to lay before you some observations upon those Restrictions on weights and wheels, which have come into operation since my last Report.

Your clerk having received sundry communications respecting the effects of those restrictions, which he has since put into my hands, I shall briefly state the purport of each, and endeavour to reply to them satisfactorily. The originals will be laid before you by your clerk.

1.—The first of these papers is a letter from Mr. Exuperius Pickering to Sir Watkin Williams Wynn, bart. dated 26th May 1821. It states, that a new toll-gate and weighing machine having been fixed between Corwen and Llangollen, had “diverted all the coal carriage from Ruabon parish to the collieries in the neighbourhood of Wrexham;” and requests that a gate and machine may be erected at the turn above Rûg, “which would place the whole on an equal footing, and produce “directly that general alteration in the construction of wheels, so extremely desirable “to the maintenance of good Roads,” &c.

2.—The second is a letter from Mr. Exuperius Pickering to your clerk, and is dated June 9, 1821. This letter, after stating the restrictions that have been acted upon, and advocating their adoption, states, that notwithstanding they were operating in a ruinous manner upon the collieries near Ruabon, “from their not having become “general on the Holyhead Road; the consequence of which is, that nearly all the “coal carriage which usually passed through Llangollen, is now diverted to the “Wrexham side of the country, as by turning down the Road to that town, through “Bryneglws, from the west side of Corwen, near Rûg, the persons are enabled to “avoid the restrictions in question.” Mr. P. then advises the erection of a tollgate and

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and machine at the place where the Wrexham Road quits the Holyhead Road near Rûg.

3.—The next is a petition from the proprietors and lessees of coal mines in the parish of Ruabon, dated June 9, 1821, with 13 signatures. It requests the Commissioners to take their case into consideration; and states the loss they are sustaining by the restrictions being put in force between Corwen and Llangollen, "previous to the erection of the intended new tollgate and bar, west of Corwen (at the turn down towards Wrexham, near Rûg)" and which has nearly diverted the whole of the coal carriage *that way*. The petitioners express their conviction "of the utility, and indeed of the absolute necessity of the restrictions in question, (if good Roads are to be maintained;)" but request that such gates and check bars may be erected, "as may render the operation of the restrictions in question *sufficiently general*," "that the collieries of Wrexham and Ruabon may as heretofore be placed on an equal footing." They then pray that a tollgate &c. may be put up as above-mentioned near Rûg.

4.—The fourth is a letter from Mr. Exuperius Pickering to your clerk, dated 16th June 1821, in which he acknowledges the receipt of a previous letter from your clerk; and regrets that the place he had pointed out was rendered impracticable, by the clause in our Act of Parliament referred to in your clerk's letter to him. Mr. Pickering then suggests, as the only alternative, "the immediate erection of a tollgate and weighing machine on the *west side* of the Druid Inn, between it and the spot where the Bala Road turns off." Mr. Pickering further thinks, that though the Commissioners may have no power to erect a tollgate to collect tolls between Corwen and the Druid Inn, yet that they have full power to fix a check bar and weighing machine at the Road near Rûg, to enforce the new regulations; and thinks it incumbent on them to do so.

5.—The fifth and last paper is a petition from the yeomen and farmers resident in the hundred of Penllyn and Eidernion in Merionethshire; without date.

The petitioners state themselves oppressed, 1st and 2dly, by not being allowed to carry more weight upon 6-inch wheels than 30 cwt; 3-inch wheels being allowed to carry the same weight, whilst broad wheels do less injury than narrow ones; 3dly, because the penalty for overweight is 5s. a horse for all breadths, without distinction; 4thly, that it would be less oppressive if the tolls upon 3-inch wheels were advanced in proportion to the overweight, than to pay the present fine; 5thly, because one horse drawing a cart is liable to the fine, the same as if drawn by two, three, or more horses; 6thly, they consider that wheels under 3 inches should be subject to advance of toll only, because many small farmers are unable to procure the wheels required. The petitioners then proceed to a picture of agricultural distress, and conclude by praying, that they may be allowed to carry more weight upon broad wheels.

From the foregoing papers, it appears that Mr. Pickering and the coal proprietors near Ruabon are all decidedly of opinion, that the restrictions which have been adopted respecting weights, and the construction of wheels, are not only highly beneficial, but absolutely necessary for the maintenance of a good Road. The only complaint from these gentlemen is, that the penalties are not sufficiently general, but operate in favour of the Wrexham collieries, and consequently to the prejudice of those near Ruabon.

In N^o 1, 2 and 3, Mr. Pickering and the Ruabon coal-masters request that a gate and weighing machine may be put up near Rûg, about half way between the Druid Inn and Corwen, where the Wrexham Road quits the Holyhead Road, as by that means the same penalties might be levied upon coal carts coming from Wrexham, as are now levied upon those from Ruabon. In our Act of Parliament (59th Geo. III. c. 30, sec. 37.) there is a clause that the Commissioners shall not erect any gate or gates for the collection of tolls, between the town of Corwen and the Druid Inn. This clause, therefore, according to my construction, precludes the possibility of our erecting a gate or levying penalties at the place recommended by Mr. Pickering and the coal masters. In N^o 4, however, Mr. Pickering differs from this opinion, and thinks that though we have no power to collect tolls there, yet that we have power to erect a side gate and weighing machine and put the restrictions in force. Now as the only means we have of putting these restrictions in force, is compelling the payment of a higher toll than usual, under the name of a penalty, I cannot think we possess the power of levying this higher toll, when it is admitted we have none whatever to demand the lesser.

If this point be established, Mr. Pickering's next proposition (see N° 4) is to erect a gate and machine immediately on the west side of the Druid Inn, so as to catch all carts passing up the Bala Road, and also those going towards Cernioge along the Holyhead Road. The strict letter of the Act states, that no gate shall be erected between Corwen and the Druid Inn; now Corwen being east of the Druid Inn, there appears at first sight no law against the erection of a gate at the west side of the Inn. But the Bala Road bends close round the end of the Inn, and quits the Holyhead Road; and the intention of the clause recited, was to allow carts &c. to pass from Corwen towards Bala, without paying any toll upon the Holyhead Road. It depends therefore upon the construction of this clause, whether we have the power to erect a gate at the west end of the Inn. The precise letter of the clause does not appear to prevent us, but certainly its spirit and intention are decidedly against the erection.

A weighing machine might be put down at the present tollgate, west of the Druid Inn, which would catch all the carts going along the Holyhead Road towards Cernioge, whether they came from Wrexham or elsewhere; but the trifling number which pass into that mountainous district, would never pay the Commissioners for the expense, and I think would be of very little service to the Ruabon collieries.

The assertions in N° 1, that the restrictions had "diverted all the coal carriage" from Ruabon parish to the collieries in the neighbourhood of Wrexham; and in N° 2 and 3, that it had diverted nearly all, are disproved by the fact of 245 carts and 52 waggons loaded with coals from Ruabon, &c. having passed through the tollgate betwixt Corwen and Llangollen, in the short time of four weeks ending the 17th of November last; and this is the gate referred to as the one where our regulations are so strictly enforced. Nor is it the case, as stated in N° 2, that those restrictions are not general upon the Holyhead Road; as their operations extend over the whole of the Road west of Llangollen.

The "intended new tollgate and bar west of Corwen," mentioned in N° 3, is a mistake, as the Commissioners, I believe, never had an intention of putting one up there.

The petitioners, in the paper numbered 5, complain that they are oppressed by the new regulations, and state the grounds upon which they rest their complaint. Having myself attended at the drawing up of the clause respecting narrow wheels and overweight, I can state that the principle upon which that clause was founded, was to prevent, as much as possible, the injury which the Road would otherwise sustain from the heavy loads that would pass along it, and the improper construction of the wheels then generally in use. The common breadth of a cart wheel being then seldom more than 2½ inches was ill calculated for the heavy weights it had to carry, and the tire being generally fastened on with nails, the heads of which stood near an inch above its surface; it was often the case that more than a ton weight was resting on the head of a nail only an inch square. In about every 6 inches one of these nail heads was buried in the Road's surface, and the stones beneath it completely crushed. The materials on each side of these punch-holes were always displaced; and half a dozen carts following each other, never failed to cut the Road into ruts. The old principle of endeavouring to make bad Roads into good ones, by adopting very broad wheels and regulating the number of horses, was considered wholly erroneous. For, to have a good Road, it must in the first place be properly constructed with well prepared and durable materials; and in the second place, kept in order, by preventing the injury that follows from excessive weights and ill constructed wheels. In framing the clause alluded to, it was considered that 4 inches was a proper breadth for a cart wheel, and 15 cwt. as much as ought to rest upon it.

If a less breadth were allowed, the weight to be carried should be reduced in a greater ratio than the diminution of the breadth; for 15 cwt. resting upon a breadth of 4 inches, does less injury than 7½ cwt. resting upon a breadth of 2 inches. The reason is, that a Road being composed of a number of separate stones, a narrow wheel often works its way between them, and forms a rut by pressing them out of their places; whilst a broader wheel, by embracing a larger surface, would rest upon the stones and subject them to no disturbance whatever.

If wheels of a greater breadth than 4 inches could be so constructed that the whole of that breadth should rest equally upon the Road, and so as simply to roll along without any dragging, then the wider the wheels were the better. But this I consider next thing to an impossibility; and experience fully proves, that broad wheels upon the common construction, are not much better than those of 4 or 5 inches;

inches; for a 9-inch wheel, instead of being bound with one plain ring of iron, has in general three iron rings or tires in breadth, the middle one projecting about half an inch above the other two, and so leaving the whole weight upon its breadth of 3 inches which ought to rest upon 9. When this middle tire is worn down to the level of the side ones, then another evil arises, which is, that the diameter of that side of the wheel which is nearest the cart or waggon, being greater than that of the other side, the wheel, instead of simply rolling on the surface, partakes partly of a rolling and partly of a dragging motion. For supposing the circumference of one side of the wheel to be a foot more than the other, (and as it is evident that each side must pass over the same space in any given time) the consequence will be, that for every revolution which the wheel makes, the smallest side must be dragged 12 inches. This objection applies also to 6-inch wheels, though in a less degree; and even a 4-inch wheel is not free from it, though it is so trifling as scarcely to produce any practical effect. If the common 6-inch wheels are examined, it will be found, that upon a hard surface there is very seldom a greater breadth than 4 inches resting at any one time upon the Road; the remaining breadth, therefore, is almost useless; and I am satisfied, that additional breadth of wheels upon the common construction, cannot be an equivalent for the injury done by greatly increased weights resting upon them.

As the penalties were intended to act as a prohibition of improper weights and wheels, it would be useless to make distinction between the broad and narrow; and what has already been stated, has, I think, shown that there is not so much difference in the injury done by a 6-inch and a 4-inch wheel, as the petitioners seem to suppose.

It is stated in the petition, that a one horse cart is liable to the fine the same as if it were drawn by two, three or more horses; this is not the case, as the fine is regulated by the number of horses; so that if drawn by one horse, it is 5s.; if by two horses, 10s.; and if by 3 horses, 15s.

Were wheels under 3 inches to be allowed to pass along the Road, by merely paying a light additional toll, it would not produce the effect intended by the new regulations; and I can see no way of allowing them to travel, but by reducing the weight they have to carry. For instance, a pair of 24-inch wheels to carry only about 1 ton, and 2-inch wheels 12 cwt. This might be an accommodation to a few fish and market carts.

It should be remembered, that before the new regulations were put in execution, they were advertised in the provincial papers, printed circulars posted up and distributed, and every means taken to make them as public as possible, for two years before they came into operation; and even then, instead of levying the penalties upon all wheels under 4 inches, the Commissioners, with a view to press as lightly as possible upon the farmers, consistently with the principle upon which they were acting, allowed all wheels of 3 inches to pass, without inflicting the penalty.

Having now gone through the various matters contained in the papers referred to me, I shall conclude my Report with the assurance, that

I remain,

Very respectfully,

Your faithful servant,

W. A. Provis.

Bangor,

March 1, 1822.

P. S.—Since closing the foregoing Report, a letter has been put into my hands, of which the following is a copy:

February 25th, 1822.

" This country is much aggrieved by the Act of Parliament passed in May 1810, relative to the Holyhead Road, empowering the tollkeeper, at the weighing machine between Llangollen and Corwen, to charge five shillings a horse, if the weight (including the cart) exceeds thirty hundred; and when it does exceed that weight, the gatekeeper seizes coal, lime, malt, or whatever the load happens to be, in any quantity he thinks fit, and appropriates it to his own use, and of course this power is much abused, as he is judge and juror in his own cause; and it would be particularly desirable that the power should be vested in the magistrates, instead of him, for at present his power is absolute, and no appeal. There have been many instances of loads being weighed at Llangollen, and these being only eight and twenty hundred; but at the gate above mentioned, they have been obliged to give the extortioner a hundred of coal for passing through, for over-126.

"weight. As it would be highly desirable for the country to be relieved from such a burthen, I shall be particularly obliged, when you have an opportunity, if you would ask what steps we had best take," &c.
To ———

On receiving the above letter, I lost no time in making inquiry into the charges exhibited against the toll collector; and from all the information I have been able to procure, he stands quite clear of extortion or any breach of duty. I cannot learn that he ever seized either coal, lime, or malt; and the only case of seizure in any shape was that of a horse, when the driver refused to pay the penalty. This was afterwards settled at a justice meeting, by the man paying the amount of the said penalty, and the horse being delivered up in exchange. The seizure was justifiable under the 20th section of our Act of Parliament. In one instance, I have been informed, that rather than pay the penalty for overweight, a carter took the excess from off his load of coals, and told the gatekeeper he might keep them. This was at the time the collector first came to the gate, and when he was uncertain how to act; he afterwards mentioned it himself to the Road inspector, who advised him to have nothing to do with their coals again; and he has, I believe, strictly adhered to his instructions.

Mr. ——— is mistaken in stating, that the collector is judge and juror in his own cause; for by the 69th section of the Act, any collector taking undue toll, or in anywise misbehaving, is liable to a penalty not exceeding five pounds, as may be adjudged by the justice or justices before whom the information shall be laid. And in the 70th section, all disputes about tolls or goods distrained, may be settled by a justice; so that the power of correcting abuses actually rests where Mr. ——— states that it ought to be.

The difference in weight at Llangollen, and at our machine, I think is clearly accounted for; because I have been informed by a Ruabon coal-master, that they sell their coals by the long hundred weight of 120 lbs. whilst our machines are adjusted to the standard of 112 lbs. to the hundred weight; so that 28 long hundred weight at the pits is exactly 30 standard hundred weight, when it is tried on our machine. It is also customary to give them a hundred or two over at the pits, to allow for waste, and keep their customers in good humour.

W. A. Provis.

Shrewsbury and Bangor Ferry
ROAD.

ANNUAL REPORT

OF THE

COMMISSIONERS

Appointed under Act 59 Geo. III, c. 39, for the
Line of Road from *Shrewsbury*, in the County
of *Salop*, to *Bangor Ferry*, in the County of
Carmarthen:—

VIZ.

I.

GENERAL STATEMENT of the Income and
Expenditure of the *Shrewsbury and Bangor
Ferry Road*, for the Year ending 1st February
1822.

II.

REPORT of Mr. W. A. Provis, to the Commis-
sioners, of his Proceedings on the Road from
Shrewsbury to *Bangor Ferry*; dated 1 March
1822.

Ordered, by The House of Commons, to be Printed,

25 March 1822.

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IS TO BE PRESERVED IN
THE
BODLEIAN LIBRARY,
OXFORD.

1822.



